Pretend or Amend? On Evergreening in CRE*

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Abstract

Banks can use loan modifications to either genuinely ease distress or to merely mask credit losses ("extend and pretend"). Examining commercial real estate (CRE) loans after the COVID-19 shock, I find little support for the extend and pretend view. I use loan level supervisory data to demonstrate that (i) banks *reduced* extensions for the most troubled loans during the period of stress; (ii) banks tightened terms for extensions, demanding higher spreads and new equity contributions rather than granting subsidized credit; and (iii) less-capitalized banks granted slightly fewer extensions during the period of stress. I construct a model of maturity extensions, and show that these patterns are more consistent with banks mitigating the effects of market illiquidity, rather than delaying loss recognition.

Keywords: commercial real estate, banks, evergreening

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Preliminary and Incomplete: Analysis of performance of recently extended loans coming in October

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1. INTRODUCTION

In many models of financial intermediation, the defining feature of bank credit is greater flexibility to renegotiate loan terms (see, for example, Rajan, 1992 and Hackbarth et al., 2007). By modifying troubled loans, banks can reduce loan losses by preventing more costly resolution methods (Bolton and Scharfstein, 1996).[1] However, this flexibility can be a double-edged sword; if banks modify loans to hide impairment rather than mitigate losses, these "zombie" loans can result in credit misallocation (Peek and Rosengren, 2005; Caballero et al., 2008) or financial stability risks as banks gamble for resurrection (Bruche and Llobet, 2014).

Distinguishing between these types of modifications has become particularly important in recent years, as CRE market strains created need for loss-mitigating modifications at the same time that regional bank strains potentially motivated loss-obscuring ones. While communications from regulators have emphasized the benefits of working proactively with stressed borrowers (Federal Reserve and others, 2023), others have noted the risk of more pernicious modifications that could harm banks down the road (Jiang et al., 2024; Crosignani and Prazad, 2024).

In this paper, I investigate whether bank CRE loan extensions align more with "amend and extend" behavior, whereby banks restructure loans to improve future repayment prospects, or "extend and pretend" behavior, where the goal is delayed loss recognition. I begin by presenting a model of maturity extensions that incorporates the various motivations banks might have for providing extensions. In the model, banks may extend loans to delay loss recognition (Crosignani and Prazad, 2024), avoid dead weight insolvency costs (Faria-e Castro et al., 2024) or give borrowers more time to find a suitable buyer (Sagi, 2021). In deciding the extension terms to offer, banks weigh these benefits against debt overhang costs from undercapitalized borrowers failing to maintain the property (Myers, 1977).

The model demonstrates that lenders' motivation for providing extensions can be inferred by the relationship between a loan's debt yield—net operating income (NOI) divided by the loan balance—and the principal paydown required for an extension. Lenders looking to delay loss recognition need to provide subsidized terms to highly-stressed borrowers to motivate those borrowers to accept extensions rather than default. Borrowers with weaker incomes therefore receive forbearance from required payments. In contrast, extensions that remedy frictions selling or refinancing a property go to owners that are motivated to retain the property. Terms for these extensions are determined by lenders' desired credit enhancements (rather than borrowers' participation constraints) and thus borrowers with weaker incomes are required to offer larger paydowns to mitigate repayment risks.

I then use detailed supervisory data on bank CRE loan holdings to test the model. Although banks frequently extend loans upon maturity, I present three pieces of evidence against these extensions reflecting extend and pretend behav-

[1] This ability to mitigate losses by renegotiating loan terms in turn can account for the selection of smaller (Hackbarth et al., 2007), riskier (Black et al., 2020) or more liquidity constrained (Glancy et al., 2022b) borrowers into banks.

ior: (i) extensions are not concentrated income-strained properties, (ii) principal paydowns rose during the period of stress, especially for income-strained properties, (iii) banks with greater capital-preservation incentives provided fewer extensions, and those extensions had more stringent terms.

First, I examine outcomes of pending maturities by loan risk, and demonstrate that extensions tend to not be concentrated in riskier loans. In the time series, I show that in 2023 and 2024—the period coinciding with high interest rates, tight credit, and deteriorating CRE loan performance—banks extended a large share of loans (roughly half) as they matured. However, this behavior was not unusual; banks extended a similar share of loans before COVID, and even more at the onset of the pandemic. Thus loan extensions are not merely response to the stress, but a persistent feature of bank loan servicing.

Moreover, banks *reduced* extensions for low-debt-yield properties during the period of stress, the opposite of what the model predicts would have occurred if banking sector pressures encouraged banks to delay loss recognition. Likewise, the property types most affected by the pandemic were less likely to be extended than before the pandemic.

Second, I analyze the terms of extensions. As the model demonstrates, banks that want to delay loss recognition provide lenient terms to the lowest quality borrowers because they are the most likely to otherwise default and would cause the largest losses were they to default. Motivated by this reasoning, I examine whether riskier firms need to "pay" for extensions by providing credit-enhancements that improve banks' future return prospects. I find that during the period of stress, borrowers were more likely to pay down principal as a part of an extension.

While aggregate patterns are inconsistent lenient extension policies driving pandemic-era extensions, this does not rule out such behavior for some lenders. For the third piece of analysis, I follow Crosignani and Prazad (2024) and examine differences in extension patterns by bank capitalization. I show that banks with low capital ratios behave similarly to the broader sample. If anything, worse capitalized banks reduced extensions during the period of stress.

1.1. Related Literature

This paper contributes to three strands of literature. First, it contributes to work on pandemic-related CRE market strains. Gupta et al. (2022) demonstrates that the rise in remote work contributed to notable declines in incomes and valuations for office properties. Jiang et al. (2023) presents evidence that these effects compound other valuation declines from monetary policy tightening and place many small banks at the risk of solvency runs. In contrast, Glancy and Kurtzman (2024) show that CRE loan nonperformance is concentrated in types of loans that small banks have little exposure to (e.g., large-sized office loans), partially insulating them from the stress.

This paper relates most closely to Crosignani and Prazad (2024), which also uses supervisory data on large banks' CRE holdings to analyze extend and pretend behavior following the pandemic. There are two key differences: First, I focus predominantly on the behavior of the sample as whole rather than differences across banks. Though Crosignani and Prazad (2024) provide evidence that capital considerations induced some banks to extend loans on the margin—in turn crowding out new lending—my results indicate that extend and pretend behavior was small in aggregate. Second, I analyze terms, in addition to frequencies, of extensions. I show that banks require larger principal pay downs during the period of stress, particularly for riskier loans, which should mitigate the risk these troubled extensions pose to banks going forward.

Second, I relate to a broader literature on evergreening/zombie lending. This work demonstrates that weakly capitalized banks extend credit to underperforming firms to avoid writing off existing loans (Peek and Rosengren, 2005; Caballero et al., 2008). Zombie firms are typically defined by having some combination of income strains and subsidized credit (Adalet McGowan et al., 2018; Acharya et al., 2019). This notion aligns well with extend and pretend modifications in the model, which are characterized by low debt yields and lenient principal repayment requirements. My findings complement Favara et al. (2024), which uses similar data on commercial and industrial lending to show that large U.S. banks do not engage in zombie lending regardless of capitalization. A couple of factors might contribute to the apparent lack of zombie lending in this setting. First, the banks in the sample are generally well-capitalized, and thus lack the severe stresses and potential gambling for resurrection incentives that were in place in episodes typically associated with zombie lending (i.e., the Japanese financial crisis and European sovereign debt crisis). Second, the banks I study are subject to stress tests which should dampen extend and pretend incentives.[2]

Finally, I contribute to work analyzing the servicing of distressed CRE loans. Brown et al. (2006) shows that sales of foreclosed CRE properties occur at substantial discounts relative to fundamental values, motivating lenders to renegotiate loans. Black et al. (2017, 2020) document that banks' advantage in renegotiating distressed CRE loans (relative to CMBS) gives them an advantage in holding riskier loans. Glancy et al. (2022a) provide evidence that banks' forbearance policies at the onset of the pandemic supported CRE loan performance. Flynn Jr. et al. (2023) demonstrate that borrowers behave strategically when seeking modifications. This work generally discusses modifications as a means of maximizing loan recoveries, but does not touch on distinguishing this motivation from extend and pretend incentives.

The rest of the paper proceeds as follows: Section 2 presents a model of loan extensions, and derives equilibrium extension terms and maturity outcomes (extend, default or pay off). Section 3 describes the data and methodology. Section 4 presents the empirical findings. Section 5 concludes.

[2] Delaying loss recognition by rolling over risky loans could preserve capital by avoiding losses. However, the expected losses from these risky loans in a severe recession would result in a higher stress capital buffer, counteracting the ability of extensions to preserve capital buffers.

2. MODEL

2.1. *Setup*

To aid in the interpretation of observed loan extension patterns, I develop a dynamic model of CRE maturity outcomes where borrowers and lenders negotiate extension terms in order to navigate various market frictions. All parties are risk-neutral and have a disount factor of $\beta = \frac{1}{1+r}$. The timing of the model is as follows: At the end of a period, a nonrecourse loan with an outstanding balance D against a property with NOI N is scheduled to mature. The lender makes an offer to extend the loan for another period, choosing a principal pay down of pD as a condition of the extension. A value of $p = 1$ signifies that the lender rejects an extension, demanding full repayment.

Next, the borrower solicits bids on the property, and receives an offer to purchase the property at a cap rate (NOI over property value) of κ.[3] Borrowers can therefore sell the property for N/κ, and use the proceeds to to pay back the loan and accumulated interest $(1+r_m)D$, where r_m is the mortgage rate. Cash flows are assumed to occur after sales occur, so $\underline{\kappa} \equiv \frac{r-g}{1+r}$ is the cap rate that would equate the sale price with the present discounted value of cash flows, where g is per period expected income growth.

If the borrower rejects the sale offer, they can then either default, and forfeit the property, or accept the extension. If they extend the loan, they collect the income flow N, make the required principal and interest payments $(r_m + p)D$, and repeat the game next period with $D' = (1-p)D$ and a new N' which has both a stochastic component and endogenous component (reflecting maintenance incentives), to be discussed soon.

2.2. *Strategies and Payoffs*

I incorporate several frictions into the model to account for the various motivations that parties might have to extend loans at maturity.

1. **Search frictions**: κ is stochastic, creating the risk that borrowers receive a weak offer when their loan comes due. Extensions deal with this liquidity risk by giving borrowers time to shop for a better offer. I assume κ follows a Pareto distribution: $G(\kappa) = 1 - (\underline{\kappa}/\kappa)^{\alpha}$, where α parameterizes market liquidity. As $\alpha \to \infty$, the distribution of offers converges to $\underline{\kappa}$, meaning the borrowers can always sell at the fair price of a property. The expected purchase offer is $\mathbb{E}(N/\kappa) = [\alpha/(1+\alpha)]N/\underline{\kappa}$, meaning an expected discount of $1/(1+\alpha)$ if forced to sell in a particular period. While I discuss this process in terms of search for a buyer, this mechanism could also reflect search for a refinance, with κ reflecting whether the a new loan offer is sufficient to refinance the outstanding loan.

[3] Drawing a cap rate of κ is identical to pulling a value multiple of $1/\kappa$. I express values in terms of cap rates because it complements the focus on debt yields as the measure of loan risk; debt yield can be interpreted as the cap rate below which a borrower could sell a property to pay off a loan's principal.

2. **Foreclosure costs**: If lenders foreclose, they expect to recover $\Lambda N/\underline{\kappa}$, where $\Lambda \leq \alpha/(1+\alpha)$, meaning that banks recovery in foreclosure is less than would be expected from selling a property in a given period. Foreclosure costs create a discontinuous drop in lender payouts at the default threshold. Consequently, extensions may reduce expected losses by giving the loan an opportunity to recover.[4]

3. **Delayed Loss Recognition**: Lenders may face a cost to realizing losses (e.g., due to equity issuance costs or lost opportunities due to binding capital constraints). I incorporate this as an additional cost of $\chi(D - \Lambda N/\underline{\kappa})$ that lenders face if borrowers default. Since χ reflects the benefit to *delaying* losses, I model this as a one period MIT shock to lenders' flow returns, which does not affect payout functions in future periods.

The final element that I include in the model is debt overhang problems in the form of deferred maintenance. While the aforementioned elements generate benefits to extensions, endogenizing maintenance introduces a potential countervailing cost to them. Borrowers are able to receive an additional cash flow νN by neglecting maintenance, but this action reduces NOI in all future periods by a factor θ. ν and θ are such that the return to proper maintenance is high. However, borrowers that expect to default in the near future will not prioritize future cash flows and try to extract as much as they can prior to default. This mechanism imposes a cost to lenders of providing extensions against stressed properties.

Regarding players' strategies, lenders choose the terms to provide on potential extensions. For low values of N, borrowers may reject extensions even for $p = 0$ since the continuation value is low enough that it is not worth making the interest payment. In this situation, lenders can provide forbearance (capitalize interest payments into loan balances) to motivate borrowers to still extend loans. A sufficiently negative p allows borrowers to defer interest payments above property cash flows, which amounts to giving them a free option on the property.[5]

Borrowers strategies are to sell, default, or extend, and if they extend, they choose to neglect or maintain the property. Borrowers move second in the period and can condition these outcomes on extension offers and purchase offers. The actions available are thus $a \in \{\text{Extend} \times \{\text{Neglect}, \text{Maintain}\}, \text{Default}, \text{Sale}\} \times p$. Let a_n and a_m denote actions that entail neglect and maintenance occurring, respectively.

Since returns are homogeneous of degree one in D and N, I normalize payouts by D and express all payouts in terms of the debt yield $n \equiv N/D$.[6] The pay outs are as follows:

Expectations are over future NOI, which is assumed to be log-normally distributed. Namely, $n' = \mu(a)Zn$, where

[4] More formally, the discontinuous drop loan values at the default threshold (absent an extension) causes loan values to be convex in N. Lenders are willing to extend loans since increases in N raise loan values more than declines reduce it.

[5] Lenders have other options to prevent highly-distressed borrowers from defaulting, such as reducing interest rates or forgiving part of the loan balance. I account for these possibilities in the empirical work, but focus on forbearance in the model because it keeps the payout structure the same (just with the possibility of p going negative).

[6] Note that a value function normalized to D is defined as $v(N/D) = V(D,N)/D$. This means that pay downs have the effect of creating a normalized continuation value $V(D',N')/D = (D'/D)v(V'/D') = (1-p)v(n')$.

Table 1: Payouts

Outcome	Borrowers $V_b(n;p,\kappa)$	Lenders $V_l(n)$
Sell	$n/\kappa-(1+r_m)$	$1+r_m$
Extend & Maintain	$n-(r_m+p)+\beta(1-p)E[V_b(n';a_m)]$	$r_m+p+\beta(1-p)E[V_l(n';a_m)]$
Extend & Neglect	$(1+\nu)n-(r_m+p)+\beta(1-p)E[V_b(n';a_n)]$	$r_m+p+\beta(1-p)E[V_l(n';a_n)]$
Default	0	$\Lambda n/\underline{\kappa}$

Z is log normally distributed with $\mathbb{E}(Z)=1$, and μ is either $\mu_m=(1+g)/(1-p)$ or $\mu_n=(1-\theta)\mu_m$, depending on borrowers' maintenance incentives. To simplify notation, denote the integral defining borrowers' and lenders' expected values in the next period as $\mathscr{V}_i(X)\equiv\int_0^\infty V_i(ZX)dF(Z)$ for $i\in\{b,l\}$, then discounted continuation values can be expressed as $\beta(1-p)\mathscr{V}_i(\mu n)$ for the appropriate μ.

Note that lender's value functions omit the potential cost to loss recognition $-\chi(1-\Lambda n/\underline{\kappa})$. I exclude that term here so that the payouts expressed here are consistent with the value functions that determine the continuation values from extensions. The cost to loss recognition will be added later as a one period shift in pay offs that does not affect continuation values (if loss recognition is costly in the future, there is little benefit to delaying it).

2.3. Equilibrium

I solve for a Markov perfect equilibrium where lenders select a pay down (p) as a function of the state (n) to maximize the expected recovery from a loan, and borrowers optimally select an action depending on the current state, the required pay down, and sale offer (κ).

Borrowers and lenders choose the strategies and receive expected payouts according to the following Bellman equations:

$$V_b(n)=\mathbb{E}_\kappa\left[\max\left\{\underbrace{0}_{\text{Default}},\underbrace{\frac{n}{\kappa}-(1+r_m)}_{\text{Sell}},\underbrace{n-(r_m+p^*(n))+\beta(1-p^*(n))\mathscr{V}_b(\mu_m n)}_{\text{Extend-Maintain}}\right.\right.$$
$$\left.\left.\underbrace{(1+\nu)n-(r_m+p^*(n))+\beta(1-p^*(n))\mathscr{V}_b(\mu_n n)}_{\text{Extend-Neglect}}\right\}\right] \quad (1)$$

$$V_l(n)=\max_p\{\pi_{\text{sale}}(n,p)(1+r_m)+\pi_{\text{def}}(n,p)\Lambda n/\underline{\kappa}$$
$$+\pi_{\text{ext}}(n,p)\left(r_m+p+\beta(1-p)\mathscr{V}_l(\mu(n,p)n)\right)\}$$

where $\pi_{\text{sale}}(n,p)$, $\pi_{\text{def}}(n,p)$, and $\pi_{\text{ext}}(n,p)$ are the probabilities that the borrower pays off a loan, defaults and extends, respectively. These outcomes are potentially stochastic from the perspective of a lender because they do not know what κ a borrower will draw. These probabilities are derived in Appendix B.1. $p^*(n)$ denotes the optimal pay down coming from lenders' optimization problem.

The algorithm to solve for the policy functions is outlined in Appendix B.2. Briefly put, the model is solved by guessing the value functions ($\mathscr{V}_b$ and $\mathscr{V}_l$), and then (i) solving for borrowers' optimal action as a function of n, p and κ based on the guess for $\mathscr{V}_b$, (ii) finding the lenders' optimal $p^*(n)$ given borrowers' policies, (iii) updating the value functions based on these best responses, and (iv) iterating until value functions converge.

2.4. *Graphical Analysis*

Here I will graphically characterize how equilibrium outcomes in the model are determined. The expressions underlying this analysis are discussed in Appendix B.3.

Starting with the borrower's decision, there are two key functions that determine whether a borrower is willing to accept an extension for a given n and p, and if so, whether they choose to maintain the property following an extension.[7] First, there is a function giving the maximum pay down that firms are willing to make in order to receive an extension. This curve is upward sloping since high debt yields increase the cash flows that borrowers earn during the extension period and increase the chance that the borrower can profitably sell the property in the future, both of which make borrowers more willing to offer credit enhancements to avoid default. Second, there is a downward sloping function giving the paydown such that borrowers are indifferent between neglect and maintenance. Paydowns above this line reduce expected future distress enough that borrowers are motivated to maintain the property.

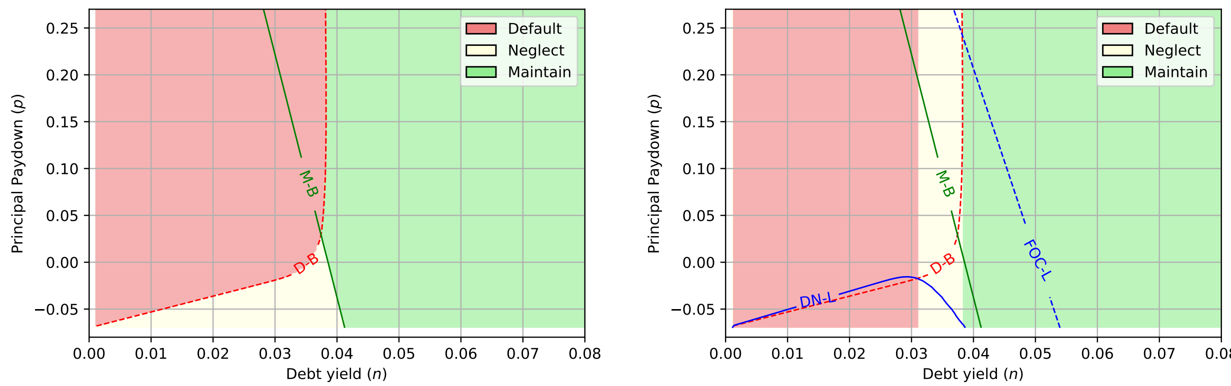
Panel a of Figure 1 plots these lines, and shows the associated loan outcomes as a function of n and p. Parameter values are set to match estimates from other literature, as is discussed in Appendix B.4, and are presented in Table A.1. These parameters entail an expected 7.5% discount if forced to sell immediately ($\alpha = 12.3$) and 24% foreclosure costs ($\Lambda = 0.76$), but no cost to loss recognition ($\chi = 0$). D-B denotes the borrowers' default boundary, and M-B denotes the boundary for which they choose to maintain the property.

These curves define three regions. Borrowers default when n, p is above D-B (the red region). They maintain the property when n, p is to the right of the D-B and M-B curves, meaning the debt yield is high enough that extension is preferred to default and maintain is preferred to neglect (the green region). Finally, they neglect the property when n, p is below both curves, meaning that lenient extension policies prevent default but do not leave borrowers sufficiently committed to the property to maintain it (the yellow region).

Turning to the lenders' problem, the regions in panel (a) determine the participation constraints lenders face in choosing extension terms. For debt yields above where the default boundary asymptotes, borrowers are willing to accept any

[7] For now, I ignore the sale option, so this discussions pertains to how borrowers behave when they either receive a weak offer (high κ) or have a bet yield such that paying off the loan is infeasible at any possible sale offer.

Figure 1: Equilibrium Maturity Outcomes



(a) Borrowers' Indifference Conditions

(b) Lenders' Optimality Conditions

Notes: Panel (a) plots the pay downs and debt yields for which borrowers are indifferent between Default and Neglect (DN-B), Default and Maintain (DM-B) and Neglect and Maintain (NM-B). Red, yellow, and green regions show where borrowers would choose to Default, Neglect, and Maintain, (respectively), given an extension offer of (n, p). Panel (b) adds the line showing where lenders are indifferent between default and neglect (solid blue line), and the unconstrained lender's first order condition (blue dashed line). The colored regions denote the outcomes at a given debt yield for lenders' equilibrium pay down rate.

principal pay down and lenders do not need to worry about borrowers neglecting the property. In this area, lenders require the pay down amount that satisfies the first order condition to maximize lenders' extend-maintain payout (from the second row of table Table 1). The optimal paydown entails paying the loan down enough to reduce the risk to the lender, but still maintaining a loan balance so that lenders can benefit from the spread they earn on the loan. This curve is downward sloping since it takes a higher pay down to mitigate the risk of future defaults (or stressed extensions). Denote this curve FOC-L.

At debt yields below where D-B and FOC-L meet, lenders would like a higher pay down than borrowers are willing to make. At these debt yields, lenders would demand the highest pay down borrowers would accept (i.e, the $D - B(n)$). Extensions occur when lender's payout at this contract is above what they would receive from foreclosure. Denote DN-L as the minimum pay down lenders would be willing to accept from a borrower that would neglect the property (defined implicitly by setting lenders' value from foreclosure and extend-neglect equal to one another). If this curve sits below, the D-B curve, there is room for a mutually beneficial extension.

Panel (b) of Figure 1 adds FOC-L and DN-L to the figure, reflecting lender's optimality conditions. The blue line shows the minimum pay down a bank needs to be willing to extend a loan (DN-L). For the parameter values displayed, this line mostly sits above the red lines denoting the maximum pay down borrowers are willing to make, meaning that the loans wind up defaulting rather than getting extended. Where the blue and red line meets, there is room for a mutually agreeable extension with a modest pay down. The shaded regions now pertain to outcomes that occur for the equilibrium $p = p^*(n)$. In the baseline calibration, there is only a modest region where lenders offer extensions such that borrowers would neglect the property (the narrow yellow band). This point occurs close to where borrowers become willing to provide larger pay downs, so incomes much above that level involve more substantial pay downs, the size of which are determined by equation FOC-L (the blue dashed line), rather than the borrower's participation constraint.

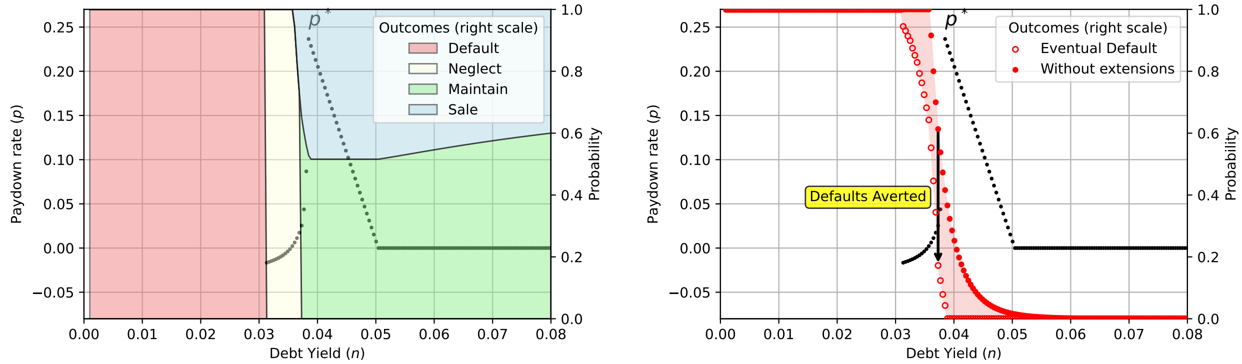
Figure 2 shows how the observed outcomes of these extensions, namely what happens at maturity (default, extend, or pay off), the principal pay downs associated with extensions (p^*), and whether loans ultimately pay off. Panel (a) presents maturity outcomes and pay down rates. It adds two pieces of information relative to Figure 1: the equilibrium paydowns on extensions (black dots), and whether loans payoff at maturity (the blue region).

It clarifies that there are two distinct debt yield regions in determining extension terms. At low debt yields, lenders are constrained by borrowers' participation constraint, so extensions are determined by how large a pay down borrowers are willing to make. This causes p^* to be an increasing function of n. At higher debt yields, lenders are not constrained by borrowers' willingness to pay down a loan, so outcomes are determined by the size of a concession that lenders would like to mitigate risks of future property value declines. In this region, p^* declines in n because higher incomes reduce the need for pay downs to mitigate future default risk.

Panel (b) shows that p^* and n are informative as to future repayment prospects. Hollow red dots show the probability that a loan eventually pays off (potentially after a strong of extensions), and solid red dots show the probability that a loan with a given debt yield would pay off if lenders were unwilling to extend a loan. Extensions reduce the risk of default, but depending on the debt yield and principal pay down, sometimes future default remains highly likely. There is a steep drop in default risk caused by extensions at the point that borrowers become willing to maintain the property and the risk of future default becomes very low once borrowers are no longer limited in their willingness to pay down loans.

In short, even though the future performance of extended loans is not observable in real time, the conditions of the property and the terms of the extension are highly predictive of future repayment prospects. If a loan has either a high debt yield or a meaningful principal paydown, it means that a borrower is committed to the property and the property is likely to pay off once they are able to get a competitive offer to sell (or refinance). Extensions with minimal concessions at lower debt yields are the ones that are unlikely to successfully pay off without a loss in the future. In the baseline calibration with no capital preservation incentives, these extensions are still efficient since the potential to avoid foreclosure costs is enough to compensate debt overhang costs. However, a by product of these actions is still that realized loan delinquencies could mask underlying CRE market strains since banks are extending loans that will likely default in the future.

Figure 2: Observed Extension Outcomes



(a) Equilibrium Principal Paydowns

(b) Eventual Loan Performance

Notes: Panel (a) plots equilibrium principal day downs (black solid dots, left scale), and the probability that different maturity outcomes occur (colored regions, right scale). Red, yellow, green and blue regions show the probability that borrowers would choose to Default, Neglect, Maintain, and pay off a loan (respectively), given an extension offer of p^*. Panel (b) adds information on ultimate performance; hollow yellow dots show the probability that a loan with a given n eventually defaults, and solid red dots show the probability that a loan would have defaulted if extensions were not available. The red area shows the decline in the probability of eventual default due to extensions.

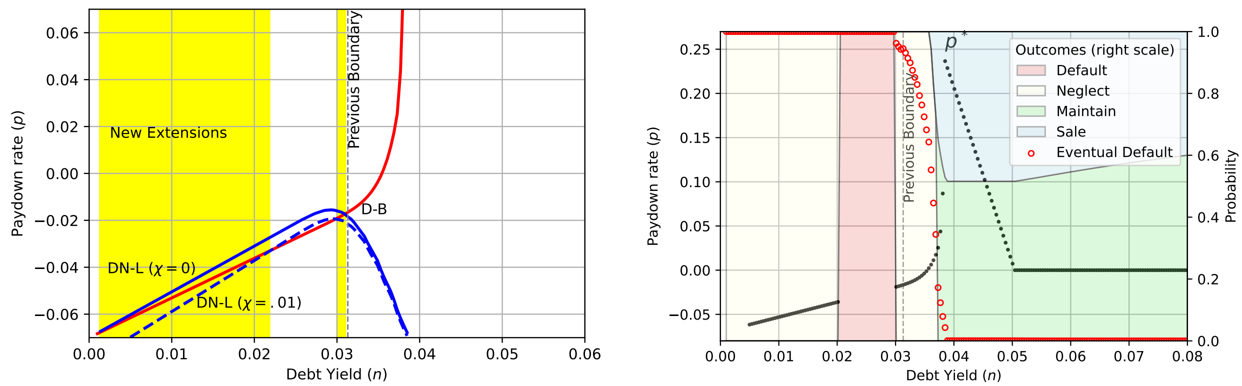
2.5. Comparative Statics

This section investigates how changes in model parameters affect equilibrium maturity and extension outcomes. Since the primary topic of interest is extend and pretend, I start by showing what happens when the benefit to delaying loss recognition rises (χ) from 0. I then briefly characterize the effects of changing property market liquidity (α), foreclosure costs (Λ) or debt overhang effects (ν and θ) to provide more clarity on the general model mechanisms.

Extend and Pretend Incentives Figure 3 plots how increasing χ to 0.01 affects maturity outcomes. The left panel plots the shift in the $DN-L$ curve brought about when lenders have a temporary cost to less recognition. The cost to loss recognition reduces the paydown that lenders require to extend loans since lenders are more motivated to prevent default, even temporarily. The shift in the curve is most pronounced for very low debt yield properties, since those loans would post the largest losses without an extension. This results in new extensions occurring for two debt yield regions. First, loans just below the debt yield boundary where loans previously started to receive extensions (the vertical dashed line) start getting extended. Without benefits to delaying loss recognition, foreclosure only offered slightly higher expected returns than extending for these loans, so the small additional benefit to extensions was enough to induce lenders to extend. These new extensions occur in the right-most yellow region.

The second range of loans affected are those at the bottom of the debt yield distribution. These loans get extended because they would produce the largest losses without an extension, and thus are most affected by the cost to loss recognition. These new, highly-stressed extensions occur in the left-most yellow region.

Figure 3: Extend and Pretend Incentives (χ: 0→1%)



(a) Lenders' required paydowns shift down

(b) Low p, n and future repayment for marginal extensions

Notes: The solid blue and red lines panel a show the p such that lenders and borrowers are indifferent between extension and foreclosure, respectively. The dashed blue line shows how borrowers' indfifference condition shifts if *chi* increases to 0.01. The highlighted area demonstrates the range of debt yields that newly receive extensions in equilibrium due to the change in lender payouts. Panel (b) provides outcomes at maturity when the baseline calibration is updated such that $\chi = .01$. Red, yellow, green and blue regions represent the probability of default, neglect, maintain, and pay off. Black dots give required pay downs by debt yield (left scale) and red hollow dots the probability that a loan ultimately defaults.

The right panel adds information on principal pay downs and the eventual probability of repayment. To the right of the dashed line, outcomes are all identical to those of the baseline calibration shown in Figure 2. The shift in lenders' willingness to extend loans doesn't affect outcomes in that region since the change in payoffs is temporary (and thus doesn't affect borrowers' expectations for future extension policies) and because lenders make a take-it-or-leave-it offer (and thus lenders' greater surplus does not affect the terms of extensions when they occur). New extensions start to occur for the low debt yields as documented in the left panel. These extensions are associated with negative pay downs (the black dots showing $p^*(n)$ are below 0) and virtually no chance of loans ultimately repaying (the red dots showing the probability of eventual default are near 1). Unlike in the baseline calibration, lenders do not extend loans because the chance of avoiding foreclosure costs is enough to compensate debt overhang effects. Lenders benefit from delaying default and are willing to extend loans with minimal repayment prospects.

Roles of Other Frictions While the primary focus of the paper is on extend and pretend, examining how competing motivations for extensions affect observable outcomes is also useful for understanding extension patterns seen in the data. Figure A.1 presents model outcomes isolating the effects of the three drivers of extensions. Panel (a) shows outcomes with just search frictions, panel (b) outcomes with just foreclosure costs, and panel (c) outcomes with just costs to loss realization.

These figures show that the various motivations to extend loans operate in distinct debt yield regions. Search frictions cause extensions only at high debt yields. Lenders have no reason to avoid foreclosure, and thus do not extend loans where borrowers would engage in inefficient maintenance practices after. Foreclosure costs cause extensions for debt yields just below where the point that borrowers would be able to pay the loan off. Finally, costs to loss recognition prompt lenders to extend the most highly-stressed loans, while allowing some closer-to-viable loans to default.[8]

Overall, these results point to a clear distinction between search-related frictions and those related to resolution costs. Search-related extensions go to borrowers that maintain the property, and have either high current debt yields or large paydowns (increasing future debt yields) so that the risk borne by lenders is minimal. In contrast, extensions related to costs of foreclosure or loss recognition tend to entail lower debt yields, low principal repayment, poor maintenance incentives and poor future repayment prospects. The primary distinguishing factor is degree, as these issues are all more pronounced for extensions to delay loss recognition; since the motivation is to delay rather than minimize losses, poor future repayment prospects are less of a concern.

Regarding the effect of debt overhang, panel a of Figure A.2 shows the effects of reducing the amount that borrowers can divert from the property (reducing θ and ν by half). This change increases the range of debt yields over which lenders are willing to provide extensions with the purpose of avoiding foreclosure costs. Panel (b) shows that this reduction in debt overhang effect has a similar effect similar to a 7 percentage point increase in foreclosure costs. Extensions in that region involve lenders trading off the costs of property value declines due to debt overhang effects and the benefit of potentially avoiding foreclosure costs, and thus reducing the former has similar effects as increasing the latter.

Recap These figures provide the foundation for the empirical work in the next section. To summarize the results, if strains related to rapid monetary policy tightening and regional banking turmoil prompted banks to extend and pretend, we would expect to see the following based on Figure 2:

1. More extensions during the period of stress
2. Extensions to occur at lower debt yields
3. Extensions to have more lenient terms (less principal repayment)
4. Extended loans to have lower ex-post payoff rates

More generally, the motivation for extensions can be inferred by a combination of the debt yield of the loans getting extended and the terms of those extensions. Extensions to prevent or delay default due to income strains go to borrowers with low debt yields and entail minimal borrower concessions since borrowers would default if extensions required such concessions. Extensions to deal with selling or refinancing frictions go to borrowers include either have high debt yields or high principal pay downs.

[8] If we were to remove all three frictions, no extensions would occur at all; borrowers would repay loans if possible and default otherwise.

3. DATA AND METHODOLOGY

Data Source The primary data comes from FR Y-14Q Schedule H.2 filings, a loan level panel on CRE loan holdings that banks report for their stress tests. This data provides loan-quarter information on loans with committed balances over $1 million from banks with more than $100 billion in assets. I start the sample in 2016q1 since information on loan disposal began the following quarter, so this is when I am first able to identify what happens to loans that leave the balance sheet.[9] The sample of loans I use and variable construction differs throughout, so I will discuss those in turn with the methodology for each piece of analysis.

Extension Frequencies In the analysis of extension frequencies, I study outcomes of loans that are slated to mature in four quarters, and assess loan outcomes as of the quarter of maturity. The outcomes considered are:

1. Paid off: If the loan is disposed of in the following year, and the disposition code indicates a voluntary pay off
2. Extension: If the loan is current and on the balance sheet at the end of the quarter of maturity, but the maturity date was extended into the future.
3. Ballooned: If the loan is not past due, but the reporting date is after the current maturity date.
4. Delinquent: If the loan is past due in the quarter of maturity, or is marked as liquidated or involuntary paid off by that point.

Figure 4 plots the rate at which loans are paid off, extended, or go delinquent by the number of quarters until the loan is slated to mature. It shows that both before the pandemic and during the period of heightened CRE stress it was very common for loans to receive extensions in the quarter of scheduled maturity. The bigger change was a higher incidence of loans going delinquent at maturity staring in 2023.

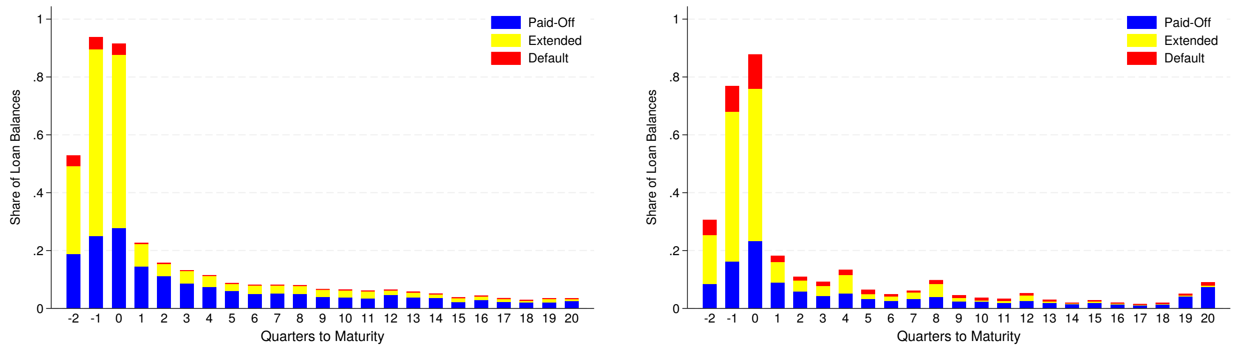
Important to the methodology, the figure shows that the occurrence of these outcomes rises slightly in the year before maturity, and then jumps in the actual quarter of maturity.[10] Consequently, the one year window we consider should capture most extensions, payoffs and delinquency associated with a pending loan maturity.

I examine the frequency that loans with pending maturities receive extensions both over time, and across loans with different loan or property characteristic. In the time series, I define the period of CRE stress as covering the period from 2023-2025. This period was characterized by high interest rates following the 2022 run up in inflation and subsequent monetary policy tightening, tight credit conditions following the March 2023 regional banking turmoil, and additional strains for offices driven by the persistent rise in remote work. In analysis comparing extensions during

[9] I exclude from the analysis a small number of loans that cease being reported because they are sold or syndicated, transferred to another Y-14 schedule, or have their balance drop below the reporting threshold.

[10] We do not show a bar for ballooned loans since that outcome can only occur following maturity.

Figure 4: Loan Outcomes by Time to Maturity



(a) Pre-COVID

(b) 2023-on

Notes: These figures report loan outcomes by the number of quarters to maturity. Each bar shows the share of outstanding loan balances that are paid off (blue), extended (yellow) and delinquent or liquidated (red). The left panel shows results for the years 2016-2019, and the right years from 2023-2025. Quarters to maturity is based on the previous quarter's maturity date. For example, the 0 bar shows the outcomes for loans that were scheduled to mature in a given quarter as of the previous quarter.

the period of stress relative to normal times, "normal times" pertains to loans scheduled to mature before 2020:Q1. Namely the variable 2023-on$_t$ takes the value of 1 for loans scheduled to mature in 2023 or later, and 0 for loans scheduled to mature before 2020. I exclude the onset of COVID from this analysis because modification tendencies were atypical, and driven more by short term income disruptions rather than longer-term valuation concerns. See Glancy et al. (2022a) for a description of modification patterns during COVID.

In the cross-section, I principally measure loan risk by a loan's current debt yield, which is defined as the ratio of the most recently reported (NOI) to the outstanding loan balance. This variable thus measures the ability of a property's cash flows to pay back a loan. I bottom- and top-code NOI at 0 and 0.2, respectively, to reduce the effects of outliers and reporting errors.[11] I mark debt yield as missing when it has either not been updated in the last year, or when the loan is not for a stabilized property. In these cases, debt yield is less informative because it is either stale, or because the loan's performance depends on post-renovation or construction cash flows rather than in-place cash flows. These loans with missing NOIs are dropped from analysis entirely focused on debt yields, or set to the median value for a quarter in analysis that includes debt yield as one co-variate to avoid limiting the sample. In this later circumstance, the specifications include an indicator for whether the debt yield is missing anywhere that the debt yield variable is used.

The main regression specification for this analysis is

$$100 \times \text{Extension}_{i,t} = (\beta_0' + \beta_1' \text{2023-on}_t) X_{i,t} + \beta_2 \text{2023-on}_t + \gamma_{b(i)} + \varepsilon_{i,t} \tag{2}$$

[11] Debt yield becomes a less meaningful measure when NOI turns negative as higher loan balances start to reduce debt yield. The top-coding is motivated by a likely diminishing returns to benefits to loan performance from a higher debt yield.

where $X_{i,t}$ is a vector of variables related to loan risk, including the loan's debt yield, indicators for whether the loan is an office loan or an office loan over 250,000 square feet in size, and an indicator for if debt yield is missing. These variables pick up either the strength of current cash flows (debt yield) or the risks to the outlook for future cash flows given the extent of strains for offices, and in particular large-sized offices, during the stress period (Glancy and Kurtzman, 2024). The main coefficients of interest are β_1', which measure how much more or less likely banks become to extend loans with different risk factors during the period of stress.

Extension Terms In the second piece of analysis, I shift attention from extension frequencies to extension terms. Conceptually, if banks see extensions as a way to delay loss recognition, they would want to offer liberal policies that would be accepted by the lowest-quality loans (since those loans would produce the highest losses if borrowers reject extensions). A bank that sees a property as economically viable, and an extension as a prudent way to address refinancing frictions, would be more likely to require concessions from the borrower to signal their commitment to keeping the property and protect the bank in the event of future distress.

Not all terms of extensions are observable in the data. Banks may require additional covenants, lockbox provisions, or the funding of reserves for future property improvements as a condition of an extension. Banks may also collect fees for modifying loans. However, one of the primary concessions that lenders require for extensions is in the data: pay downs. If the financial conditions of a property have deteriorated such that it no longer meets a bank's underwriting requirements, the lender can require the borrower to pay down a portion of the loan to remedy this problem. I construct three variables pertaining to how banks change balances on loan extensions:

1. Pay down$_{i,t}$: The percentage point decline in loan balances in a quarter in excess of the scheduled principal payment based on the loan's previous amortization schedule.

2. $\mathbb{1}(\text{Pay down}_{i,t} > 5\%)$: An indicator if the excess pay down exceeds 5%.

3. $\Delta\text{Balance}_{i,t} > 0$: An indicator if the committed balance rises, indicating the bank allowed borrowers to defer interest payments (the opposite of a pay down).

I exclude from the analysis loans experiencing charge-offs (since changes in principal balances may be due to partial forgiveness, though such circumstances are rare), loans with nonstandard amortization schedules (since the scheduled repayment is unknown), or lines of credit (since changes in loan balances may reflect changes in utilization).

Other terms considered are whether recourse is added to a previously nonrecourse loan, or the change to loan rate spreads for a floating rate loan.

To identify the extent to which lenders amend loan terms as a condition of an extension, I estimate a linear probability model:

$$100 \times \Delta\text{Term}_{i,t} = (\beta_1 + \beta_2 \text{2023-on}_t)\text{Extension}_{i,t} + \gamma_{b(i)} + \tau_t + \varepsilon_{i,t} \tag{3}$$

where $\Delta\text{Term}_{i,t}$ is one of the aforementioned changes in loan terms and $\text{Extension}_{i,t}$ is an indicators for whether loan i was extended in quarter t. $\gamma_{b(i)}$ and τ_t and bank and quarter fixed effects, respectively. The objects of interest are β_1, which reflects the general increased tendency of extended loans to have a given change in terms as a part of an extension, and β_2, which reflects banks' increased tendency to amend such terms as a condition for extensions during the period of stress.

Additional analysis similarly examines differences in pay downs or other extension terms by borrower risk characteristics (e.g., debt yield, recourse, office collateral).

Differences Across Lenders The last piece of analysis investigates differences in extension frequencies and terms across lenders with different capitalization levels. This analysis tests whether banks that are closer to a capital requirement extend more loans, extend more risky loans, or provide more lenient terms on extensions. Such behaviors would suggest that capital constraints induce some banks to delay loss recognition in order to preserve capital.

One complication in measuring which banks are close to their capital requirement is that how capital adequacy is assessed has changed over the sample period. Before COVID, stress tests were pass/fail based on banks' estimated capital in a "severely adverse scenario." For these years, I measure distance to capital constraints by the minimum common equity tier 1 capital (CET1) ratio in the stress tests. This variable reflects how much headroom a bank had in passing their stress tests. During the stress period, stress test results translated into capital requirements through a stress capital buffer. For this period, I measure distance to a capital constraint as the difference between a bank's CET1 capital ratio reported in their Y-9C, and their capital requirement inclusive of the bank-specific G-SIB surcharge and stress capital buffer. For each quarter, I take the median (across loans) distance to the lending banks' capital constraint, and identify a loan as from a "Low Capital" bank if that distance is below the median. I then repeat analysis along the lines of those in Equations (2) and (3), but add an additional interaction with the low capital indicator: Low $\text{Capitalized}_{b(i),t}$.

4. FINDINGS

Section 4.1 investigates whether banks are more likely to provide extensions for distressed loans. In the time series, this tests whether banks increased extensions for loans slated to mature during the period of stress, in the cross section this tests whether banks are more likely to extend loans with low debt yields. Section 4.2 discuss terms of loan extensions (e.g., pay downs and changes in loan rate spreads), and how they differ across loan risk characteristics. Section 4.3 investigates how these patterns differ across banks by their proximity to capital constraints.

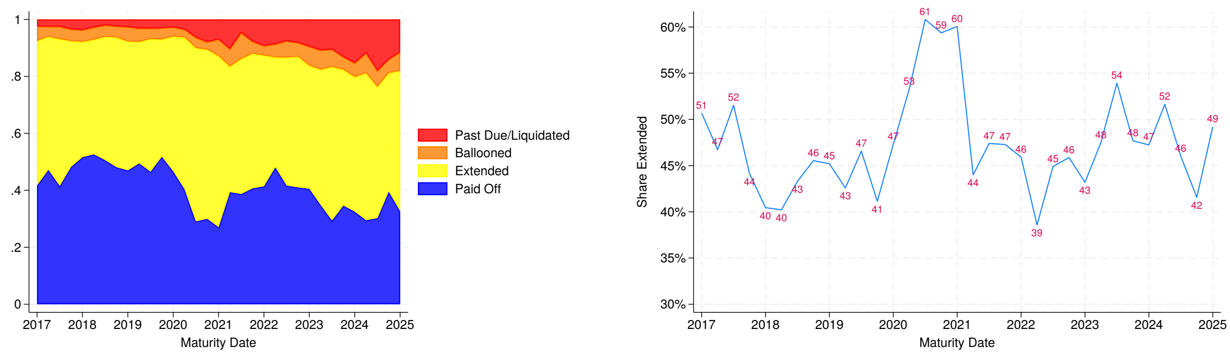
4.1. Extension Frequencies

Time series of maturity outcomes Have extensions become more common during the period of higher rates and rising CRE loan delinquency? There are a couple of reasons that one might expect this to have occurred. First, paying off loans at maturity become more difficult due to a combination of higher interest rates, lower property valuations, tighter credit conditions and reduced CRE market liquidity. These developments make it more likely that a borrower would need to be able to bring additional equity to the table to refinance a maturing loan and makes it more difficult to find a buyer to sell the property to pay off a loan. These factors would tend to cause some loans that would have otherwise get paid off to go delinquent or get extended. Second, banks have suffered significant market value declines in their fixed rate assets, which could motivate them to preserve capital by obscuring loan losses. This development could cause banks to provide borrower-friendly modifications to prevent borrowers from defaulting on their loans, causing some loans that would otherwise be delinquent to get extended.

Figure 5 plots the composition of loan outcomes for loans with a pending maturity (left) and the share of pending maturities that get extended (right) by quarter of maturity. The figure shows that extensions did indeed rise during the period of stress, but not dramatically so. The volume of maturing loans receiving extensions was around 50% for most of 2023 and 2024, compared to shares that were typically in the mid-40s before the pandemic. The share of loans paying off at maturity (the blue area in the left figure), fell from near one half before, to one third during the pandemic, but this was mostly attributable to more loans missing payments rather than more loans receiving extensions. The extension share was highest in the year following the onset of the pandemic at around 60%.

The appendix presents similar analysis at a more disaggregated level. Figures A.4 and A.5 distinguish stabilized vs. non-stabilized loans and office loans vs. other property types, respectively. The results show that outcomes of loan maturities were broadly similar for stabilized and non-stabilized CRE loans. Across property types, office loans became much less likely to pay off at maturity—only about 20% of office loan balances paid off during the period of stress, compared to over 40% before the pandemic—however, this change mostly reflected a higher rate of default rather than an increase in extensions.

Figure 5: Outcomes of Pending CRE Loan Maturities



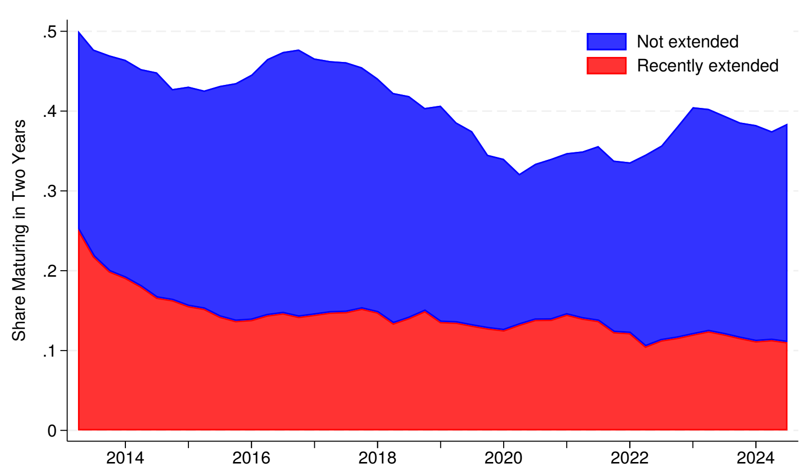
(a) Maturity Outcomes

(b) Extension Rate over Time

Notes: The left figure shows the share of outstanding loan balances that are paid off (blue), extended (yellow), performing past their maturity date (orange) and past due or liquidated (red) by the quarter of scheduled maturity. Loan balances and scheduled maturity dates are measured as of four quarters before the scheduled maturity. The right panel shows the share of balances that are extended, corresponding to the yellow region in the other chart.

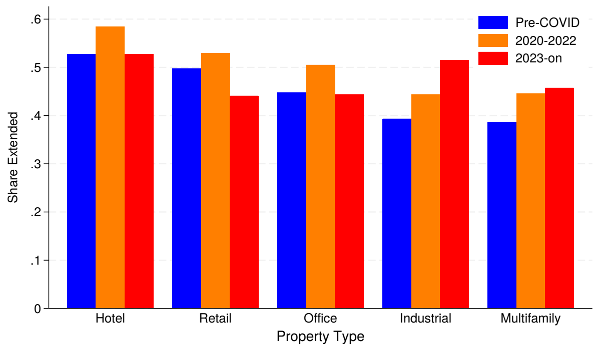
An implication of the fact that recent extension rates are in line with historical norms is that the pending "Wall of Maturities" is also not historically atypical. One frequently cited concern about recent CRE loan extensions is that it creates a build-up of near term maturities that will strain loan performance going forward. While it is true that recent extensions add to pending maturities, this situation has been the norm for the entire history of the Y-14 data collection. Figure 6 plots the share of outstanding CRE loans scheduled to mature in the next two years, and the share of those loans accounted for by recently extended loans. The share of loans maturing in the next two years is around the middle of its historical range, and the contribution from recent extensions is slightly less than normal.

Figure 6: Maturities in Next Two Years

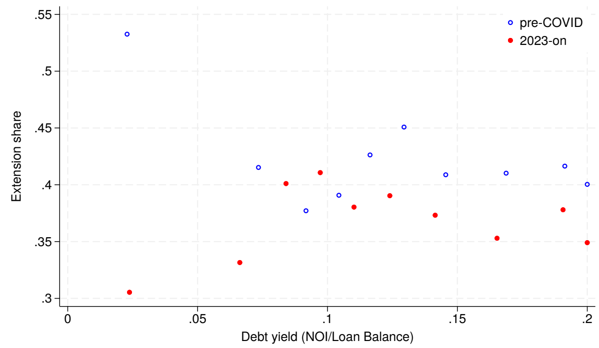


Notes: This figure plots the share of outstanding CRE loans that are scheduled to mature in the next two years over time (the top of the blue area), and the portion of those loans accounted for by loans that have received extensions in the past two years (the red area).

Figure 7: Maturity Extensions by Risk Characteristics



(a) Extensions by Property Type



(b) Extensions by Debt Yield

Notes: The left panel plots the share of loans with pending maturities that get extended by property type. Blue bars give extension rates before the pandemic, and red bars extensions during the period of stress. The right panel presents a bin scatter of an extension indicator against a loan's debt yield, for loans slated to mature before the pandemic (blue) or during the period of stress (red).

Patterns by Loan Risk One thing that this aggregate analysis misses is the risk dimension; extend and pretend modifications would go to the the lowest-quality loans. Is there a rise in high-risk extensions hidden in these aggregate patterns? Even if the pending wall of maturities from recent extensions is no larger than usual, if it is composed of more highly strained loans than usual, it could still pose elevated risks to performance going forward.

Figure 7 indicates that the rise in extensions during the period of stress not been concentrated in higher-risk loans. The left panel plots the share of pending CRE loan maturities that receive extensions by property type before COVID (blue bars), from 2020 to 2022 (orange bars) and during the period of stress (red bars). This figure demonstrates that the elevated extensions during the period of stress (relative to prepandemic extension rates) was driven by industrial and multifamily properties. Extension rates for the riskier hotel, retail and office sectors either fell or stayed the same relative to before the pandemic. Given that the rise in nonperformance during the period of stress was principally accounted for by office loans (Glancy and Kurtzman, 2024), extend and pretend behavior would presumably have caused extension rates for those loans to rise.

The right figure plots a binscatter of whether a loan with a pending maturity was extended against its debt yield. The red dots show 2023-on extension rates by debt yield deciles, while blue dots show prepandemic extension rates. During the period of stress, extensions were the *least* common in the two lowest deciles, indicating that banks became less willing to extend income-strained loans. Loans with debt yields under 0.08 were extended roughly 30-35 percent of the time, compared to extension rates between 40 and 45 percent for properties with stronger incomes. In the period before the stress, extension rates were actually highest for the lowest debt yield loans.

Regression estimates relating maturity outcomes to the period of stress and differences by loan risk characteristics are shown in Table A.2. These estimates corroborate the main findings from Figure 7; during the period of stress, extensions became slightly less common, and shifted towards properties with relatively stronger incomes.

To summarize the aggregate evidence, banks frequently extended CRE loans at maturity during the period of CRE market stress. However, this behavior appears to mostly reflect banks' normal mode of operating rather than a response to the stress itself. The rate at which CRE loans were extended at maturity during the period of stress differed little from the period preceding the pandemic, a time characterized by strong bank CRE performance and rising property values. In the cross-section, the rates at which loans with weak income (a low debt yield) or weak future income prospects (offices) were extended at maturity either stayed the same or declined somewhat. These patterns are generally more consistent with income strains causing borrowers to no longer be willing to support payments and defaulting, rather than banks offering lenient extension terms to prevent highly-stressed borrowers from defaulting.

4.2. Extension Terms

Next, I shift attention to characterizing the terms of extensions. One of the defining characteristics of zombie lending or evergreening is that lenders provide subsidized credit to induce firms to continue operating after no longer being financially viable. This stands in contrast to a loan extension for the purpose of remedying difficulties selling or refinancing in an illiquid market. In the latter circumstance, the borrower is more committed to the property and willing to amend other terms to make it worthwhile for the lender to extend.

Differences in Terms over Time Table 2 presents estimates from equation (3), regressing changes in various loan terms on an extension indicator interacted with the stress dummy. The coefficient estimate on $\text{Extension}_{i,t}$ reflects how often certain loan terms change when a loan is extended before the pandemic, while the interaction term reflects how much more or less common such changes became during the period of stress.

The first column predicts the percentage of the loan paid down in excess of scheduled amortization, and shows that extensions during the period of stress, on average, had about 2% more of the loan balance paid off upon the extension of a loan.

Columns 2 and 3 show that the higher pay down rate reflects both more extensions requiring pay downs and fewer loans receiving interest deferrals. CRE loan extensions in the period of stress were about 5.4 percentage points more likely entail pay downs exceeding 5 percent of the loan balance relative to before the pandemic, and were about 6.5 percentage points less likely to include interest deferrals. Additionally, column 4 shows that extensions during the period of stress were 1.2 percentage points more likely to switch to having recourse, though the effect is statistically insignificant. As recourse provides bank an additional means of repayment beyond the subject property, this change has a similar effect on a loan's future repayment prospect as a decline in the loan balance (Glancy et al., 2023).

The last three columns investigate changes in loan pricing. On average, extensions during the period of stress carry

Table 2: Terms of Extensions

	Pay down	$\mathbb{1}$(Pay down > 5%)	ΔBalance> 0	Gained Recourse	ΔSpread	$\mathbb{1}$(ΔSpread > 0)	$\mathbb{1}$(ΔSpread < 0)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{Extension}_{i,t}$	-0.65**	4.21**	9.60**	2.58**	-0.02**	5.39**	11.86**
	(0.17)	(0.41)	(0.67)	(0.58)	(0.01)	(0.36)	(0.66)
$\ldots\times\text{2023-on}_t$	1.92**	5.39**	-6.54**	1.18	0.08**	11.15**	-7.21**
	(0.22)	(0.64)	(0.96)	(0.83)	(0.01)	(1.09)	(0.86)
R^2_a	0.056	0.033	0.129	0.157	0.067	0.275	0.149
Observations	858,327	858,327	858,327	465,263	666,985	666,985	666,985
Bank FE?	✓	✓	✓	✓	✓	✓	✓
Quarter FE?	✓	✓	✓	✓	✓	✓	✓

Notes: This table presents estimates from the equation

$$100\times\Delta\text{Term}_{i,t} = (\beta_1+\beta_2\text{2023-on}_t)\text{Extension}_{i,t}+\gamma_{b(i)}+\tau_t+\varepsilon_{i,t}$$

where the dependent variable is the change in some loan term, scaled by 100 so estimates are in terms of percentage points. This variable is the principal paid down in excess of scheduled amortization in column (1), an indicator for whether this pay down is at least 5% in (2), an indicator for whether the committed balance rose in column (3), and indicator for whether a previously nonrecourse loan became recourse in (4), the change in loan spread in (5) and indicators for whether the spread rose or fell in columns (6) and (7), respectively. The sample changes throughout the analysis: (1)–(3) require standard amortization schedules to calculate scheduled loan payments and exclude loans with charge-offs since principal reductions might be due to forgiveness rather than pay downs, (4) requires the loan to be previously nonrecourse, and (5)–(7) require loans to have floating rates. The main independent variables are indicators for whether the loan is extended in quarter t and whether t occurs during the period of CRE stress (2023-on). All specifications have bank and quarter fixed effects. Standard errors, in parentheses, are clustered by bank-quarter. $^{+}$,*,** indicate significance at 10%, 5%, and 1%, respectively.

increases in loan spreads of about 8 basis points more than before the pandemic (when spreads declined somewhat on average for extensions). This effect is driven by banks becoming both more likely to increase spreads and less likely to reduce them.

Overall, these findings all point in the same direction, namely that the terms on extensions became more stringent. During the period of CRE market turmoil, borrowers had to pay down more debt, and pay higher interest rates to continue receiving credit. While this doesn't necessarily rule out credit being subsidized seeing as fundamental risks to the CRE market rose and likely prompted banks to require more restrictive terms, it indicates that the motivation for extensions is not merely to delay losses. Instead, banks amended loan terms in ways that improved the prospect for future recoveries, but made extensions less desirable for borrowers (thus increasing the risk that borrowers reject extensions).

Extension Terms By Loan Risk How do these terms vary by loan risk? Conceptually, if banks are concerned about preserving capital, they might require stringent terms for better-performing properties to encourage them to pay off (and allow the bank to deleverage), while offering lenient terms to riskier borrowers to discourage default. The credit enhancements demonstrated in Table 2 are principally encouraging if they are required of riskier loans.

Figure 8 presents estimated elasticities based on specification from Table 2, but for subsets of loans that carry greater risk. The left panel presents estimated effects on the likelihood that a loan has an extra principal pay down of at least 5%, and the right presents estimates for whether the loan receives a higher spread. Estimates for the other variables from Table 2 are shown in Appendix figure A.6.

Overall, the results demonstrate that concessions for riskier loans increased during the period of CRE market stress, and typically even more than for the broader sample. The left panel shows that extensions for office loans were about 10 percentage points more likely to have material pay downs during the period of stress compared to before the pandemic, nearly double the effect found for the full sample. Meanwhile, extensions of nonrecourse loans were about 8 percentage points more likely to have pay downs and extensions of low debt yield loans were about 4 percentage points more likely, a touch below the overall average of 5 percentage points.

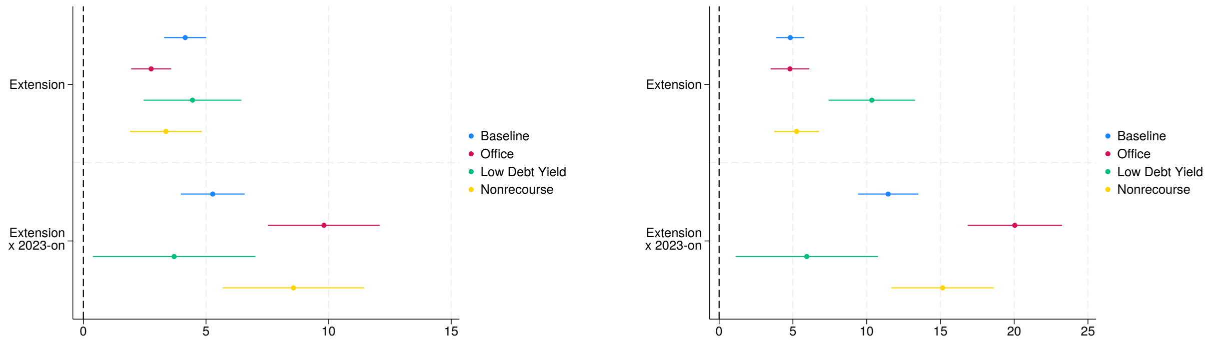
The right panel similarly shows that office loans and nonrecourse loans were about 20 and 15 percentage points more likely to have interest rate spreads increase when they were extended during the period of stress, compared to a baseline effect of 12 percentage points. Low debt yield loans were 6 percentage points more likely to have spreads rise, meaning that terms tightened during the period of stress, even if they didn't tighten relative to safer loans.

Recall from the model that only search-driven extensions had higher pay downs for riskier loans. In the range of debt yields where debt overhang was a problem, lenders had to provide subsidized credit to worse borrowers to prevent them from defaulting. That lenders receive more rather than less credit enhancements for riskier loans during the period of stress points towards them making loans with more favorable future repayment prospects.

4.3. Cross-Lender Variation

While aggregate patterns in CRE loan extensions are generally consistent with banks efficiently acting to mitigate default risk, this does not rule out extend and pretend incentives affecting servicing decisions at particular lenders. In this section, I investigate whether banks that are closer to regulatory capital requirements disproportionately provide extensions or provide particularly favorable terms on extensions. I then investigate whether lower capital banks provide more or more favorable extensions to riskier borrowers in particular.

Figure 8: Extension Terms by Risk Characteristics



(a) $\mathbb{1}(\text{Pay down} > 5\%)$ (b) $\mathbb{1}(\Delta\text{Spread} > 0)$

Notes: The left panel plots the estimated effect of extensions on whether a loan receives a principal pay down of at least 5% and the right panel plots estimates for how frequently extensions entail increases in spreads. The blue dot repeats estimates from Table 2, while the other dots present estimates from the same specification, but restricting the sample to office loans (red), loans with a debt yield under 8% (green), and nonrecourse loans (yellow).

Extension Frequency By Bank Capitalization Table 3 estimates linear probability models for whether loans that are slated to mature in four quarters get extended (columns 1–3) or default (columns 4–6) based on the lending banks' capitalization, whether the loan is maturing in the period of stress, and their interaction.

In normal times, low capitalized banks are about 6 percentage points more likely to extend a loan with a pending maturity (column 1), but there is no material difference in the prevalence of maturity defaults (column 4). That the extensions replace payoffs rather than defaults indicates that the higher extension rate reflects factors other than extend and pretend motives.

Turning to the period of stress, the coefficient on the stress indicator and its interaction with the low capitalization indicator show that well capitalized banks became slightly less ($\approx$ 1 percentage point) likely to extend loans during the period of stress, and low capitalized banks became much less likely to ($\approx$ 6 percentage points) to extend loans. Thus while low capitalized banks did extend a slightly higher share of loans at maturity overall, this reflects a general tendency that weakened during the period of stress. This finding suggests that the (slightly) higher extension rates for low capitalized banks during the period of stress are unrelated to the banking strains at the time.

Regarding defaults, the prevalence of maturity defaults at low capital banks declined relative to high capital banks (column 4). While maturing loans at well capitalized banks defaulted about 7 percentage points more often during the period of stress, the increase was only about 4.5 percentage points for low capital banks. That low capital banks had a smaller rise in maturity defaults despite reducing their tendency to extend loans at maturity indicates that the superior performance reflects factors besides banks' willingness to extend loans.

To get that these other factors, columns 2 and 5 add additional interactions between 2023-on$_t$ and variables measuring

Table 3: Extensions By Capitalization

	100×Extension			100×Default		
	(1)	(2)	(3)	(4)	(5)	(6)
Low Capitalized	6.11**	6.17**	-0.69	-0.47	-0.52	-0.23
	(1.66)	(1.65)	(1.60)	(0.45)	(0.44)	(0.65)
2023-on	-1.20	-18.02**		7.35**	14.93**	
	(2.11)	(5.27)		(0.88)	(2.51)	
...× Low Capitalized	-4.72	-4.62	-2.79	-2.87*	-2.91*	-1.73
	(3.01)	(3.02)	(2.52)	(1.20)	(1.18)	(1.26)
... × Debt Yield (%)		1.09**	0.80**		-0.74**	-0.67**
		(0.34)	(0.27)		(0.17)	(0.15)
... × Office		-1.72	-2.59		3.94**	3.94**
		(2.11)	(1.99)		(1.40)	(1.40)
... × Large Office		0.44	1.32		14.95**	14.52**
		(3.16)	(3.10)		(2.60)	(2.56)
... × No Debt Yield		6.10**	3.78+		-0.75	-0.00
		(1.94)	(1.95)		(1.00)	(0.98)
Debt Yield (%)	-0.27	-0.60*	-0.10	-0.43**	-0.19**	-0.30**
	(0.20)	(0.25)	(0.16)	(0.08)	(0.07)	(0.07)
Office	-3.39**	-2.84*	-0.89	2.96**	1.77**	1.57**
	(1.07)	(1.32)	(1.16)	(0.53)	(0.49)	(0.50)
Large Office	3.12+	3.17	1.48	1.91+	-3.36**	-3.25**
	(1.65)	(2.17)	(2.08)	(1.09)	(0.67)	(0.68)
No Debt Yield	-1.73+	-3.61**	-2.08*	0.13	0.41	-0.61
	(1.03)	(1.26)	(1.01)	(0.43)	(0.42)	(0.44)
R_a^2	0.004	0.005	0.045	0.020	0.029	0.041
Observations	33,353	33,353	33,353	33,353	33,353	33,353
Bank FE?			✓			✓
Quarter FE?			✓			✓

Notes: This table presents estimates from the equation

$$100 \times \text{Extension}_{i,t} = (\beta_0 + \beta_1 \text{2023-on}_t)\text{Low Capitalized}_{b(i),t} + \beta_2 \text{2023-on}_t + \gamma' X_{i,t} + \varepsilon_{i,t}$$

for the sample of loans that are four quarters from maturity. The dependent variable is an indicator for whether the loan gets extended in (1)–(3) and an indicator for if it defaults in (4)–(6). The main independent variables are an indicator if the loan is slated to mature in 2023 or later, and an indicator for whether the bank holding the loan is closer than the median to its regulatory capital constraint. Low Capitalized$_{b(i),t}$ is determined by the banks' minimum CET1 ratio in the severely adverse scenario in the pre-SCB era and the distance to the bank-specific CET1 capital buffer, inclusive of the SCB and G-SIB surcharge, in the SCB-era. $X_{i,t}$ is a vector of controls including the loan's debt yield, indicators whether the loan is an office loan or an office loan over 250,000 square feet in size, and an indicator for if debt yield is set to its median value (for non-stabilized loans or loans with stale income reporting). Columns (2) and (5) additionally interact $X_{i,t}$ with 2023-on$_t$, while columns (3) and (6) additionally include bank and quarter fixed effects. Standard errors, in parentheses, are clustered by bank-quarter. $^{+}$,*,** indicate significance at 10%, 5%, and 1%, respectively.

performance strains: the loan's current debt yield and indicators for whether the loan is secured by an office, or an office with over 250,000 square feet. This latter variable captures the fact that strains for office CRE loans have been highly concentrated in larger properties (Glancy and Kurtzman, 2024).

As discussed earlier, banks generally did not increase extensions for riskier property types during the period of stress. Extensions rose more for high debt yield properties and slightly less for offices. While these variables are highly predictive of default, controlling for them does not meaningfully change the predicted changes in extensions or default by bank capitalization. Finally, columns 3 and 6 add bank and quarter fixed effects. These fixed effects weaken the predicted interaction effects somewhat.[12]

Overall, there is no evidence that weaker capitalization is associated with an increase in extensions. The analysis suggests that, if anything, low capital banks reduced extensions during the period of stress. However, the coefficient estimate on 2023-on$_t$ $\times$Low Capitalized$_{b(i),t}$ is always statistically insignificant when predicting extensions. As only about 30 banks report in a typical year, there is limited statistical power to identify how specific bank characteristics are associated with servicing decisions.

Extension Terms By Bank Capitalization How does bank capitalization relate to extension terms? If low capital banks provide subsidized credit to weak borrowers to delay default, we should see those banks providing more lenient terms on extensions.

Table 4 repeats the analysis from Table 2, but adding an extra interaction term to pick up low capital banks' differential tendency to alter various terms as a part of an extension. The main coefficients of interest are those on Low Capitalized$_{b(i),t}$ $\times$ Extension$_{i,t}$, reflecting how much more often low capital banks change terms during normal times, and the coefficient on the triple interaction, which reflects how that difference changed during the period of stress.

Most of the differences are small and insignificant. In normal times, the pay down rate on extensions is 16 basis points higher for low capitalized banks (column 1), seemingly reflecting a lower likelihood of allowing balances to rise (column 3). This difference in pay down rates was about unchanged during the period of stress, with both high and low capital banks requiring an additional 2 percentage point pay down for extensions in the period of stress.

Low capital banks are slightly less likely to require recourse for extensions (about 1.1 percentage points less likely in normal times and 1.5 percentage points less likely during the period of stress), but the effect is imprecise and far from statistical significance (column 4).

[12]The estimates also no longer indicate that low capitalized banks have higher extension rates during normal times. However, the variation in Low Capitalized$_{b(i),t}$ may be driven be small changes for banks that are on the borderline between the high and low capital characterization, so this result is likely not meaningful.

Table 4: Extension Terms By Capitalization

	Pay down	$\mathbb{1}$(Pay down > 5%)	ΔBalance> 0	Gained Recourse	ΔSpread	$\mathbb{1}$(ΔSpread > 0)	$\mathbb{1}$(ΔSpread < 0)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{Extension}_{i,t}$	-0.73**	4.47**	10.87**	3.06**	-0.02**	5.64**	13.37**
	(0.23)	(0.53)	(0.86)	(0.93)	(0.01)	(0.41)	(0.96)
$\ldots\times 2023\text{-on}_t$	2.03**	4.81**	-7.43**	1.79	0.09**	9.53**	-9.28**
	(0.29)	(0.84)	(1.44)	(1.36)	(0.02)	(1.80)	(1.25)
Low Capital × $\text{Extension}_{i,t}$	0.16	-0.74	-3.01*	-1.08	0.02	-0.60	-3.52**
	(0.35)	(0.85)	(1.31)	(1.12)	(0.01)	(0.78)	(1.29)
$\ldots\times 2023\text{-on}_t$	-0.02	2.54^{+}	2.42	-0.36	-0.00	4.53^{+}	4.81**
	(0.47)	(1.33)	(2.07)	(1.78)	(0.02)	(2.43)	(1.68)
R^2_a	0.051	0.034	0.129	0.164	0.070	0.280	0.108
Observations	775,309	775,309	775,309	412,523	606,011	606,011	606,011
Bank-quarter FE?	✓	✓	✓	✓	✓	✓	✓

Notes: This table presents estimates from the equation

$$100\times\Delta\text{Term}_{i,t} = (\beta_0+\beta_1 2023\text{-on}_t)\text{Extension}_{i,t}+\beta_2 2023\text{-on}_t \\ +(\delta_0+\delta_1 2023\text{-on}_t)\text{Extension}_{i,t}\times\text{Low Capital}_{b(i),t}+\gamma_{b(i),t}+\varepsilon_{i,t}$$

where the dependent variable is the change in some loan term, scaled by 100 so estimates are in terms of percentage points. These dependent variables are as described in Table 2. The main independent variables are an indicator if the loan receives and extension, an indicator for whether it is slated to mature in 2023 or later, and an indicator for whether the bank holding the loan is closer than the median to its regulatory capital constraint (determined by the banks' minimum CET1 ratio in the severely adverse scenario in the pre-SCB era and the distance to the bank-specific CET1 capital buffer, inclusive of the SCB and G-SIB surcharge, in the SCB-era). $\gamma_{b(i),t}$ is a bank-quarter fixed effect. Standard errors, in parentheses, are clustered by bank-quarter. $^{+}$,*,** indicate significance at 10%, 5%, and 1%, respectively.

Finally, regarding pricing, there was little difference in the average change in spreads for extended loans by capitalization (column 5). Spreads increased by about 10 basis points for high and low capital banks alike. Little difference existed in normal times either, with low capital banks raising spreads for extensions by about 2 basis points more than high capital banks.

The one result that could be interpreted as evidence of low capitalized banks providing subsidized credit is that they did become comparatively more likely to reduce loan rate spreads on extensions. However, this evidence is still somewhat weak, as it is only a relative effect, not an absolute one. Low capital banks became less likely to cut spreads during the stress, the change was just larger high capital banks; high capital banks were 9.3 percentage points less likely to reduce spreads for extensions during the period of stress, while low capital banks were 4.5 percentage points less likely.

Differences By Loan Risk The findings so far regarding the effects of proximity to capital requirements indicate that (1) more capital constrained banks, if anything, provided fewer extensions during the period of stress and (2) high and low capital banks increased pay down requirements and loan rate spreads by similar amounts during the stress. In other words, capitalization relates only weakly to extension patterns.

One pessimistic interpretation of these findings is that low capital banks tried to discourage extensions from high-quality borrowers (so loans would pay off and free up capital) while encouraging them from those who might default without favorable credit. Namely, aggregate patterns might mask a shift in the composition of extensions for more constrained banks.

To assess this explanation, I repeat the analysis from Tables 3 and 4, but add additional interaction terms to capture how capitalization relates differently to extension frequencies and terms for borrowers with different risk characteristics. The primary coefficients of interest are on the triple interaction between the stress indicator, the low capitalized indicator, and various risk measures (debt yield, office indicator, large office indicator). Every specification includes lower-level interaction terms and bank-quarter fixed effects. As the bank-quarter fixed effect controls for any broad tendency to provide extensions/change terms as a part of extensions, the estimates reflect differences in how banks manage extensions across loans that differ in risk.

Table A.3 presents the results pertaining to whether or not a loan that is scheduled to mature gets extended. Overall, there is not much evidence of low capital banks disproportionately extending riskier loans. On one hand, low capitalized banks disproportionately extend loans with higher debt yields (i.e., stronger incomes). A one percentage point higher debt yield is associated with a one percentage point higher extension rate during the period of stress for low capital banks (relative to the change for high capital banks). In the other direction, low capital provide more extensions for office loans, in particular for larger offices, though the effects are statistically insignificant.

Results pertaining to loan terms are presented in Table A.4. Again, there are not strong differences across risk characteristics. Across the 21 coefficients of interest (7 loan terms $\times$ 3 risk factors), only one is statistically significant; low capital banks reduced their tendency to require recourse for extensions of large, nonrecourse office loans relative to high capital banks. Most other estimates suggest small effects; for example, a one percentage point increase in debt yield is associated with only a 2 basis point lower pay down rate at low capital banks and a one basis point reduction in loan rate spreads, on average. While directionally the results are consistent with banks providing more favorable loan terms to riskier borrowers to delay losses, differences are likely too small to drive material differences in extensions or delinquencies.[13]

[13] While the estimated effect on recourse is sizable, it is imprecisely estimated and pertains to a very small subset of the market since most loans are nonrecourse to start with and most office loans are below the size cutoff.

5. CONCLUSION

This paper uses detailed supervisory data on bank CRE loans to assess how banks are used extensions to manage CRE market strains in the period following the pandemic. I present three pieces of evidence that run counter to the notion that the extensions reflect “extend and pretend” behavior brought about by recent banking strains. First, the frequency of extensions during the period of stress was not significantly different from what was observed during normal times. Namely, frequent CRE loan extensions is business as usual, rather than a consequence of the bank or CRE market strains at the time. Moreover, banks reduced their extensions for lower income properties, suggesting extensions were not concentrated in risk loans. Second, extension terms became more stringent during the stress period. Rather the provide highly-subsidized credit, banks increasingly required equity contributions and higher spreads from borrowers to extend loans. Third, worse capitalized banks provided fewer extensions during the period of stress, and at less favorable terms, inconsistent with capital preservation incentives motivating them to adopt lenient extension policies.

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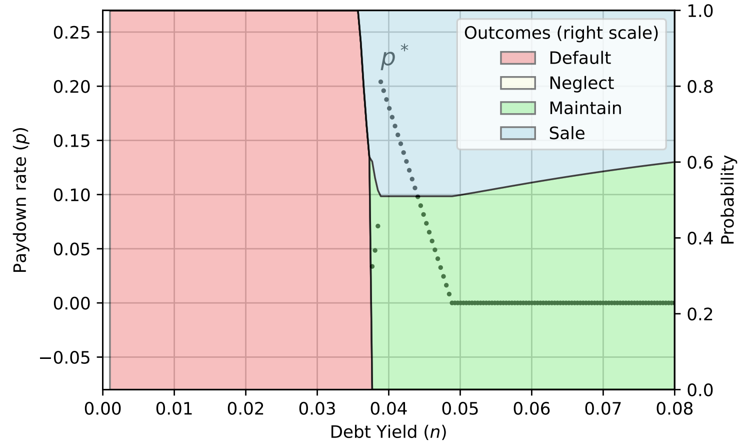
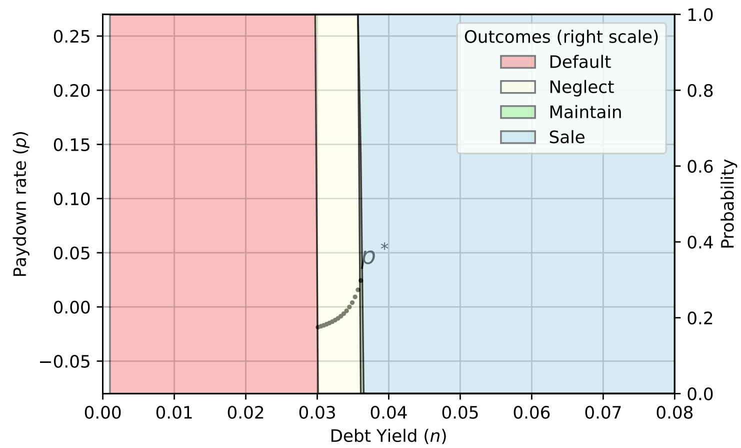
APPENDIX

A. ADDITIONAL TABLES AND FIGURES

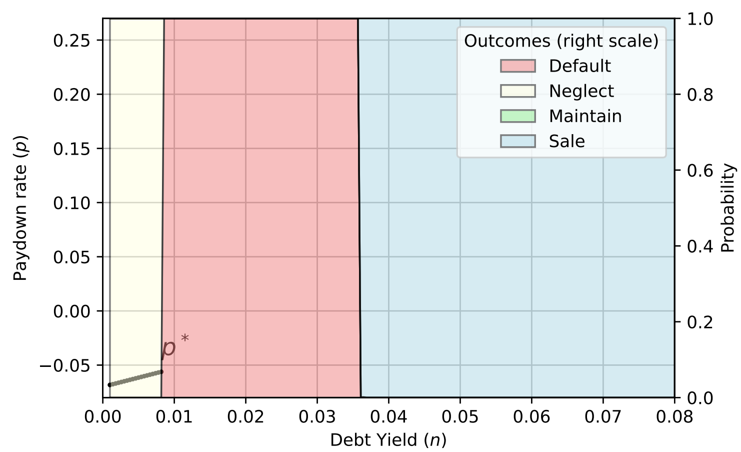
Figure A.1: What Drives Extensions



(a) Just Search Costs ($\Lambda = \frac{\alpha}{1+\alpha}$)



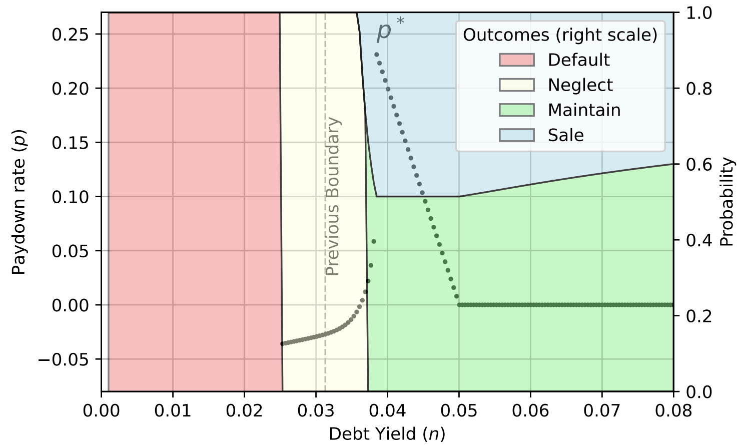
(b) Just Foreclosure Cost ($\alpha = 1000$)



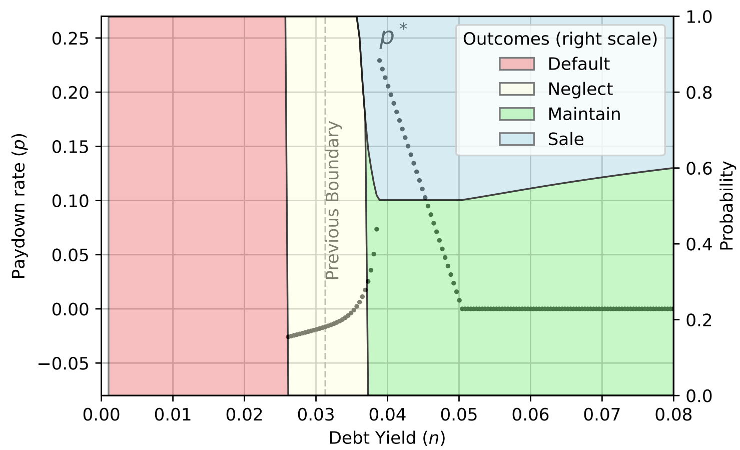
(c) Just Capital Costs ($\chi = .01, \alpha = 1000, \Lambda = \frac{\alpha}{1+\alpha}$)

Notes: Each chart presents a stacked area chart showing the probability that a loan with a given debt yield defaults (red), extends and neglects (yellow), extends and maintains (green) or pays off at maturity (blue). Black dots plot $p^*(n)$. Parameters are as in Table A.1, except only including one friction at a time. Panel (a) just has search costs ($\Lambda = \frac{\alpha}{1+\alpha}$ means lenders have no disadvantage in liquidations as costs are the same as a borrower being forced to sell). Panel (b) just has foreclosure costs ($\alpha = 1000$ essentially turns off search costs). Panel (c) just has capital costs (setting $\chi = .01$ and turning off search and foreclosure costs).

Figure A.2: Debt Overhang vs. Foreclosure Cost Trade-offs



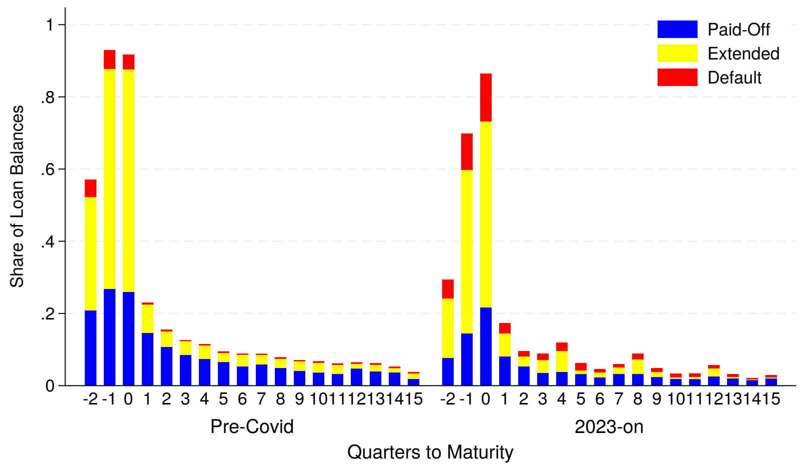
(a) Reducing ν and λ by half



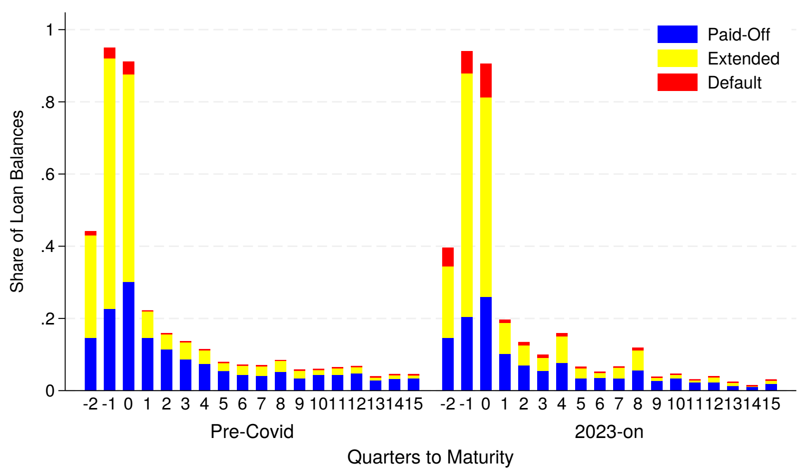
(b) Decreasing Λ by 0.07

Notes: Each chart presents a stacked area chart showing the probability that a loan with a given debt yield defaults (red), extends and neglects (yellow), extends and maintains (green) or pays off at maturity (blue). Black dots plot $p^*(n)$. Parameters are as in Table A.1, except panel (a) reduces the amount that borrowers can extract by deferring maintains by half while keeping the return to maintenance the same (λ and ν are cut in half) and panel (b) reduces the recovery amounts by 7 percentage points (to $\Lambda = 0.69$). The dashed line shows the threshold below which borrowers defaulted in the baseline calibration (before changing debt overhang effects or foreclosure costs).

Figure A.3: Loan Outcomes by Time to Maturity, By Stabilization



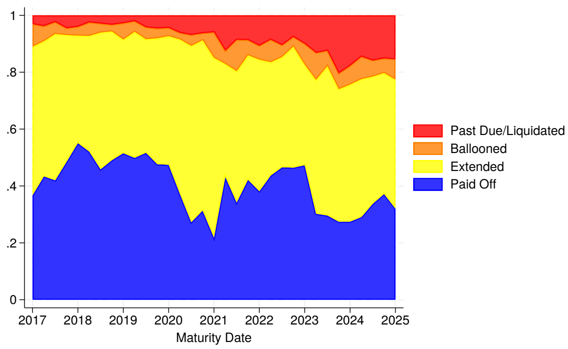
(a) Stabilized Properties



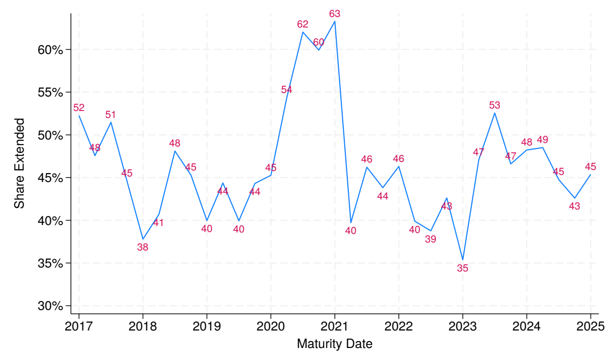
(b) Non-stablized

Notes: These figures report loan outcomes by the number of quarters to maturity. Each bar shows the share of outstanding loans that are paid off (blue), extended (yellow) and delinquent or liquidated (red). The top panel shows results stabilized properties, while the bottom shows results for non-stabilized (e.g., construction and renovation loans). Each figure separately plots outcomes for the years 2016-2019 and 2023-2025. Quarters to maturity is based on the previous quarter's maturity date. For example, the 0 bar shows the outcomes for loans that were scheduled to mature in a given quarter as of the previous quarter.

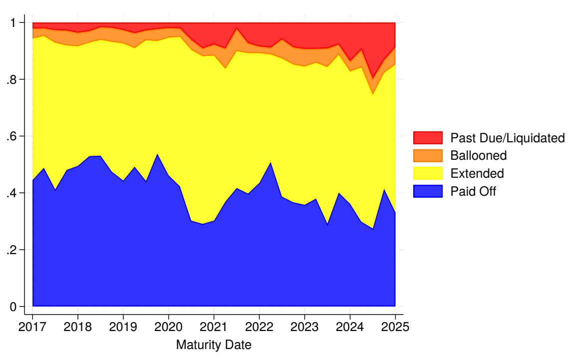
Figure A.4: Outcomes of Pending CRE Loan Maturities, By Stabilization



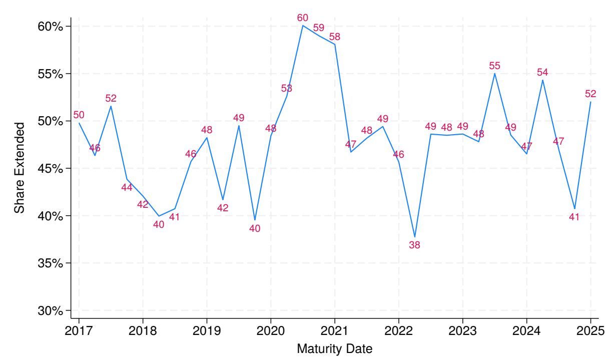
(a) Maturity Outcomes, Stabilized Properties



(b) Extension Rates, Stabilized Properties



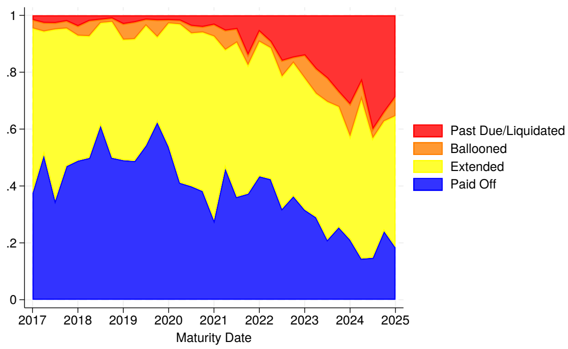
(c) Maturity Outcomes, Non-stabilized Properties



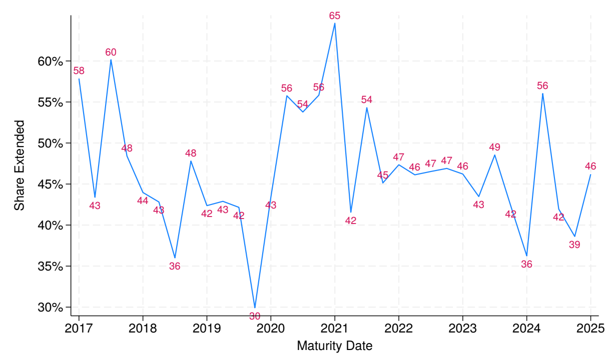
(d) Extension Rates, Non-stabilized Properties

Notes: The left figures show the share of outstanding loan balances that are paid off (blue), extended (yellow), performing past their maturity date (orange) and past due or liquidated (red) by the quarter of scheduled maturity. The right panels shows the share of balances that are extended, corresponding to the yellow region in the other chart. The top panels pertain to stabilized properties, and the bottom panels non-stabilized properties. Loan balances and scheduled maturity dates are measured as of four quarters before the scheduled maturity.

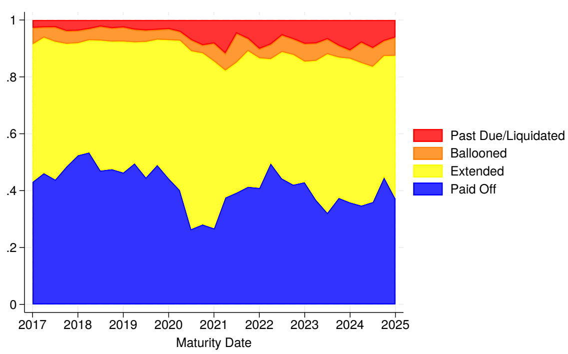
Figure A.5: Outcomes of Pending CRE Loan Maturities, By Property Type



(a) Maturity Outcomes, Office Properties



(b) Extension Rates, Office Properties

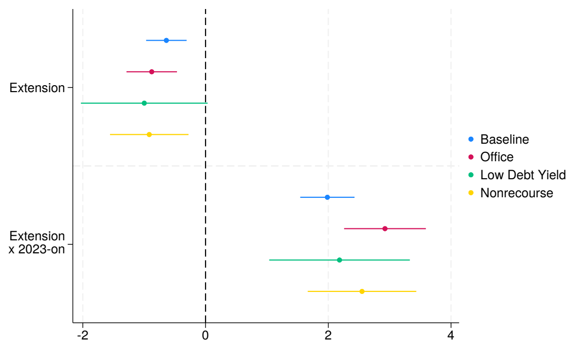


(c) Maturity Outcomes, Non-office Properties

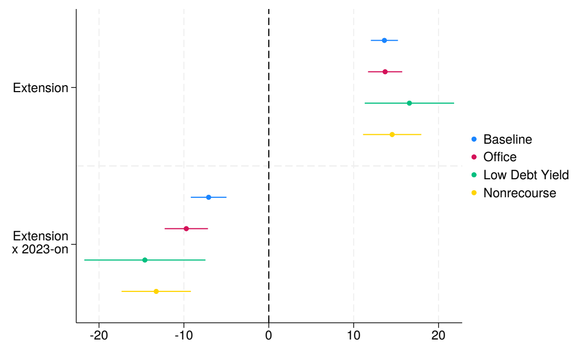
(d) Extension Rates, Non-office Properties

Notes: The left figures show the share of outstanding loan balances that are paid off (blue), extended (yellow), performing past their maturity date (orange) and past due or liquidated (red) by the quarter of scheduled maturity. The right panels shows the share of balances that are extended, corresponding to the yellow region in the other chart. The top panels pertain to office properties, and the bottom panels non-office properties. Loan balances and scheduled maturity dates are measured as of four quarters before the scheduled maturity.

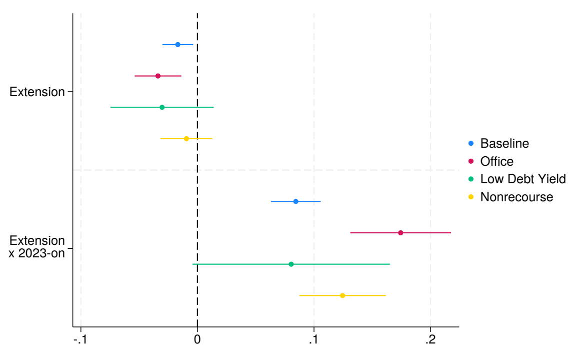
Figure A.6: Addtional Extension Terms by Risk Characteristics



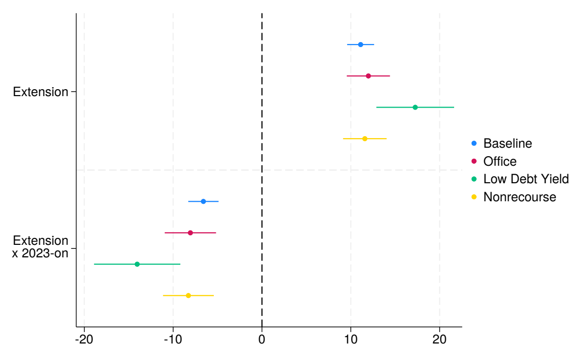
(a) Pay down



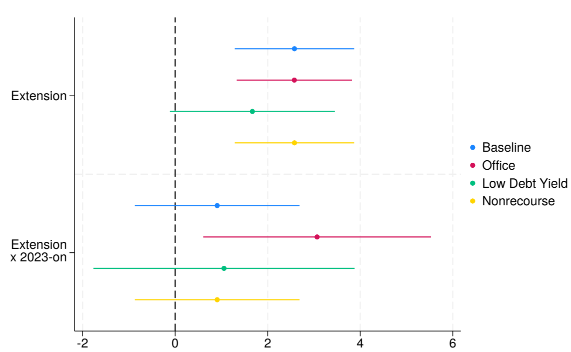
(b) $\mathbb{1}(\Delta\text{Balance} > 0)$



(c) ΔSpread



(d) $\mathbb{1}(\Delta\text{Spread} < 0)$



(e) Gained Recourse

Notes: The blue dot repeats estimates from Table 2, while the other dots present estimates from the same specification, but restricting the sample to office loans (red), loans with a debt yield under 8% (green), and nonrecourse loans (yellow).

Table A.1: Parameters used in baseline model

Parameter	Description	Value
r	Discount rate	0.045
r_m	Mortgage rate	0.07
g	Expected NOI Growth	0.01
σ	Standard Deviation of NOI Growth	0.1
α	Pareto Shape Parameter	12.3
Λ	Recovery Factor	0.76
θ	Decline in NOI from Neglect	0.045
ν	Temporary NOI Boost From Neglect	0.69
χ	Cost to Loss Recognition	0

Table A.2: Extensions During the Stress Period

	100×Extension			100×Default		
	(1)	(2)	(3)	(4)	(5)	(6)
2023-on	-3.47*	-21.39**		5.78**	14.52**	
	(1.47)	(4.62)		(0.56)	(2.41)	
... × Debt Yield (%)		1.17**	0.64**		-0.80**	-0.68**
		(0.32)	(0.24)		(0.16)	(0.14)
... × Office		-0.06	-0.91		3.73**	4.07**
		(2.02)	(1.88)		(1.26)	(1.25)
... × Large Office		0.42	-0.32		14.39**	13.72**
		(3.06)	(3.05)		(2.32)	(2.34)
... × No Debt Yield		5.94**	4.50*		-1.36	-1.59$^+$
		(1.90)	(1.83)		(0.99)	(0.96)
Debt Yield (%)	-0.29	-0.67**	-0.03	-0.45**	-0.18*	-0.30**
	(0.19)	(0.25)	(0.15)	(0.08)	(0.07)	(0.07)
Office	-2.91**	-2.88*	-0.72	2.94**	1.68**	1.38**
	(1.00)	(1.26)	(1.13)	(0.51)	(0.47)	(0.49)
Large Office	2.51	2.56	1.14	2.20*	-3.27**	-3.04**
	(1.58)	(2.12)	(2.04)	(1.05)	(0.65)	(0.66)
No Debt Yield	-1.01	-2.96*	-1.49	-0.18	0.31	-0.17
	(1.01)	(1.28)	(1.03)	(0.42)	(0.41)	(0.41)
R^2_a	0.002	0.003	0.071	0.019	0.028	0.055
Observations	36,309	36,309	36,293	36,309	36,309	36,293
Bank FE?	✓	✓		✓	✓	
Bank Quarter FE?			✓			✓

Notes: This table presents estimates from the equation

$$100 \times \text{Extension}_{i,t} = (\beta_0' + \beta_1' \text{2023-on}_t) X_{i,t} + \beta_2 \text{2023-on}_t + \gamma_{b(i)} + \varepsilon_{i,t}$$

for the sample of loans that are four quarters from maturity. The dependent variable is an indicator for whether the loan gets extended in (1)–(3) and an indicator for if it defaults in (4)–(6). The first set of columns estimate how extensions or delinquency changed during the period of stress controlling for $X_{i,t}$, a vector controls for the loan's debt yield, indicators whether the loan is an office loan or an office loan over 250,000 square feet in size, and an indicator for if debt yield is set to its median value (for non-stabilized loans or loans with stale income reporting). The second set of columns interact the controls with $X_{i,t}$, and the third replaces bank fixed effects with bank-quarter fixed effects. Standard errors, in parentheses, are clustered by bank-quarter. $^{+,*,**}$ indicate significance at 10%, 5%, and 1%, respectively.

Table A.3: Risky Loan Extensions By Capitalization

	100×Extension		100×Default	
	(1)	(2)	(3)	(4)
2023-on × Low Capitalized				
... × Debt Yield (%)	1.07^{+}	1.06^{+}	0.50^{+}	0.51^{+}
	(0.57)	(0.56)	(0.30)	(0.30)
... × Office	3.02	0.54	-4.59	-4.48
	(4.62)	(4.69)	(2.95)	(3.29)
... × Large Office		8.84		-1.03
		(8.02)		(6.00)
... × No Debt Yield	-4.95	-4.86	1.71	1.90
	(4.80)	(4.84)	(2.47)	(2.50)
R^2_a	0.071	0.071	0.059	0.063
Observations	33,340	33,340	33,340	33,340
Bank-Quarter FE?	✓	✓	✓	✓
$X_{i,t}$	✓	✓	✓	✓
$X_{i,t} \times$ 2023-on$_t$	✓	✓	✓	✓
$X_{i,t} \times$ Low Capitalized$_{b(i),t}$	✓	✓	✓	✓

Notes: This table presents estimates from the equation

$$100 \times \text{Extension}_{i,t} = (\beta' X_{i,t}) \times \text{2023-on}_t \times \text{Low Capitalized}_{b(i),t} + \gamma' \text{Lower Level Controls}_{i,t} + \tau_{b(i),t} \varepsilon_{i,t}$$

for the sample of loans that are four quarters from maturity. The dependent variable is an indicator for whether the loan gets extended in (1) and (2) and an indicator for if it defaults in (3) and (4). The main independent variables are triple interaction terms between (i) an indicator if the loan is slated to mature in 2023 or later, (ii) an indicator for whether the bank holding the loan is closer than the median to its regulatory capital constraint and (iii) a loan level variable reflecting default risk. The vector of default risk-related variables, $X_{i,t}$, includes the loan's debt yield, indicators whether the loan is an office loan or an office loan in a high-telework-eligible market, and an indicator for if debt yield is set to its median value (for non-stabilized loans or loans with stale income reporting). All specifications include lower level interactions and levels of all variables, and bank year fixed effects. Standard errors, in parentheses, are clustered by bank-quarter. $^{+}$,*,** indicate significance at 10%, 5%, and 1%, respectively.

Table A.4: Extension Terms By Capitalization and Risk Characteristics

	Pay down	$\mathbb{1}$(Pay down $>$ 5%)	ΔBalance>0	Gained Recourse	ΔSpread	$\mathbb{1}(\Delta\text{Spread} > 0)$	$\mathbb{1}(\Delta\text{Spread} < 0)$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2023-on $\times$ Low Capitalized							
... $\times$ Debt Yield (%)	-0.02	-0.01	0.03	0.41	-0.01	-0.02	-0.13
	(0.12)	(0.39)	(0.48)	(0.36)	(0.01)	(0.49)	(0.42)
... $\times$ Office	-1.09	-1.84	2.12	4.22	0.01	-1.27	1.93
	(1.02)	(3.10)	(3.79)	(4.12)	(0.05)	(3.57)	(2.67)
... $\times$ Large Office	1.41	6.91	6.98	-15.81**	-0.01	4.85	1.89
	(1.62)	(5.70)	(5.22)	(5.47)	(0.08)	(5.41)	(4.17)
... $\times$ No Debt Yield	1.35	2.28	-0.27	1.48	0.02	-0.14	-6.75*
	(0.89)	(3.33)	(4.33)	(3.01)	(0.05)	(3.80)	(2.87)
R^2_a	0.070	0.056	0.092	0.240	0.055	0.136	0.072
Observations	20,187	20,187	20,187	9,721	27,980	27,980	27,980
Bank-Quarter FE?	✓	✓	✓	✓	✓	✓	✓
$X_{i,t}$	✓	✓	✓	✓	✓	✓	✓
$X_{i,t} \times$ 2023-on$_t$	✓	✓	✓	✓	✓	✓	✓
$X_{i,t} \times$ Low Capitalized$_{b(i),t}$	✓	✓	✓	✓	✓	✓	✓

Notes: This table presents estimates from the equation

$$100 \times \Delta\text{Term}_{i,t} = (\beta' X_{i,t}) \times \text{2023-on}_t \times \text{Low Capitalized}_{b(i),t} + \gamma' \text{Lower Level Controls}_{i,t} + \tau_{b(i),t} \varepsilon_{i,t}$$

where the dependent variable is the change in some loan term, scaled by 100 so estimates are in terms of percentage points. These dependent variables are as described in Table 2. The main independent variables are triple interaction terms between (i) an indicator if the loan is slated to mature in 2023 or later, (ii) an indicator for whether the bank holding the loan is closer than the median to its regulatory capital constraint and (iii) a loan level variable reflecting default risk. loan's debt yield, indicators whether the loan is an office loan or an office loan over 250,000 square feet in size, and an indicator for if debt yield is missing. All specifications include lower level interactions and levels of all variables, and bank-quarter fixed effects. Standard errors, in parentheses, are clustered by bank-quarter. $^{+}$,*,** indicate significance at 10%, 5%, and 1%, respectively.

B. MODEL APPENDIX

B.1. Expectations over Sale Offers

Whether borrowers choose to extend or sell depends on the sale offer borrowers receive. Thus if n is high enough that it is possible for borrowers to want to sell, maturity outcomes are stochastic, and expected payouts come from integrating over κ.

First, I solve for the critical $\kappa^*(n)$ below which borrowers with a debt yield of n choose to sell. If borrowers reject a sale offer, they will either default or extend, making their outside option to selling $V^+_{b,ext} \equiv \max\{V_{b,\text{maintain}}, V_{b,\text{neglect}}, 0\}$. The optimal κ^* is such that borrowers are indifferent between selling and that outside option. This occurs when $n/\kappa^* - (1+r_m) = V^+_{b,ext}$, meaning that

$$\kappa^*(n) = \frac{n}{1 + r_m + V^+_{b,ext}}$$

If $\kappa^*(n) < \underline{\kappa}$, there is no chance of a sale, and the borrower either defaults or extends.[14] That is, either $\pi_{\text{ext}}(n,p) = 1$ or $\pi_{\text{def}}(n,p) = 1$ depending on whether a mutually beneficial extension is feasible. If $\kappa^* \geq \underline{\kappa}$, the probability of a sale is $\pi_{\text{sale}}(n,p) = G(\kappa^*) = 1 - \left(\frac{\underline{\kappa}}{\kappa^*}\right)^{\alpha}$.

The borrower's value function in the region where sales are possible comes from integrating over potential offers:

$$\begin{aligned} V_b(n) &= \int_{\underline{\kappa}}^{\kappa^*} \left(\frac{n}{\kappa} - (1+r_b)\right) g(\kappa) d\kappa + \int_{\kappa^*}^{\infty} V^+_{b,ext} g(\kappa) d\kappa \\ &= n \frac{\alpha}{1+\alpha} \left[\frac{1}{\underline{\kappa}} - \frac{1}{\kappa^*}\left(\frac{\underline{\kappa}}{\kappa^*}\right)^{\alpha}\right] + V^+_{b,ext} \underbrace{\left(\frac{\underline{\kappa}}{\kappa^*}\right)^{\alpha}}_{\text{Pr Sale Rejected}} \end{aligned}$$

The lender's value function comes from applying the sale, extension and default probabilities to equation (1).

B.2. Numerical Solution

1. Make an initial guess for borrowers' and lenders' values, $\mathbf{V_b}$ and $\mathbf{V_l}$, on a grid of debt yields $\mathbf{n}$.
   (a) I use the values that would prevail if extensions were not an option: $\mathbf{V_b} = \max\{\mathbf{n} - (1+r_m), 0\}$, and $\mathbf{V_l} = \mathbb{1}[\mathbf{n} > (1+r_b)](1+r_m) + (1 - \mathbb{1}[\mathbf{n} > (1+r_m)])\Lambda \mathbf{n}/\underline{\kappa}$

[14] Note that at the minimum n such that a sale is possible $(V_{b,ext})^+ = 0$ since the borrower is required a pay down to make them indifferent to default. This means that the minimum n at which a sale could occur is $n = (1 - r_m)\underline{\kappa}$.

2. Take expectations over a log normal distribution to calculate continuation values implied by those value functions (solving for $\mathscr{V}_b(n')$ and $\mathscr{V}_l(n')$).

   (a) Note that $n' = \mu Z n$, where $\mu = (1-\theta\mathbb{1}[\text{neglect}])(1+g)/(1-p)$, and Z is a log-normally distributed variable such that $\mathbb{E}(Z) = 1$. Since the effects of pay downs, neglect and value appreciation in terms of normalized continuation values are isomorphic to a change in initial NOI, one can take a single expectation (for $\mu = 1$) and use that function to find continuation values associated with other outcomes.

   (b) Expectations are estimated by Gauss-Hermite quadrature, interpolating between grid points. For quadrature points falling off the grid, I linearly extrapolate from the last two grid points to calculate lenders' value functions below the grid and borrowers' value functions above the grid. Other off-grid values as assumed to stay at the value for the last grid point.

3. Use $\mathscr{V}_b(n')$ and $\mathscr{V}_l(n')$ to find borrowers' and lenders' value functions for a given action $a(n,\kappa) \in \{\text{Extend} \times \{\text{Neglect}, \text{Maintain}\}, \text{Default}, \text{Pay off}\} \times p$.

4. Solve for borrowers' optimal actions as a function of n, p, κ.

5. Solve for lenders' optimal p as a function of n.

6. Update value functions using the optimal actions $a^*(n,\kappa)$. Integrating over the Pareto distribution for κ, gives the ex-ante values for borrowers' and lender's, $\mathbf{V_b}$ and $\mathbf{V_l}$, over n (see Section B.1).

7. Check for convergence, otherwise return to step 1 with the updated $\mathbf{V_b}$ and $\mathbf{V_l}$.

B.3. Characterization of Equilibrium

B.3.1. Borrowers' problem

I will start by discussing borrowers' optimal decision to default, neglect or maintain given a particular debt yield and paydown requirement. Whether borrowers choose to default for low values of n is determined by Equation (DN-B), which is named for the fact that it (implicitly) defines the boundary for which borrowers are indifferent between default and extend-neglect. If the return to maintenance is high enough, some borrowers with higher debt yields will be on the margin between default and extend-maintain, this indifference condition is given by Equation by (DM-B).

$$(1+\nu)n - (r_m + p) + \beta(1-p)\mathscr{V}_b\left(\frac{(1-\theta)(1+g)n}{1-p}\right) = 0 \tag{DN-B}$$

$$n - (r_m + p) + \beta(1-p)\mathscr{V}_b\left(\frac{(1+g)n}{1-p}\right) = 0 \tag{DM-B}$$

The upper envelope of these two expressions gives the maximum p that a borrower with a debt yield of n is willing to make. In equilibrium, lenders are constrained by borrowers' default decisions at low ns and thus require the largest pay down that borrowers are willing to make, meaning that borrowers are indifferent to default. If continuation value is negligible—namely there's almost no hope of a borrower leaving the region in which they are indifferent to default—$\mathscr{V}_b \approx 0$. For these low values of n, borrowers choose neglect over maintain, and (DN-B) is approximately $p = (1+\nu)n - r_m$. In other words, lenders require all cash flows from the property to go towards loan payments. Since those cash flows are low, this would entail interest payments that exceed property cash flows getting capitalized into the loan balance.

More generally, p is increasing and convex in n. A higher n means that both there is both higher cash flows available to the lender (reducing the need for forbearance) and more potential for price appreciation to pull the property into the region where a sale can be profitable for the borrower (meaning borrowers are willing to make principal and interest payments that exceed property cash flows).

The second relevant margin is whether high-n borrowers choose to maintain the property. Borrowers are indifferent between M and N when the following equation holds. When the left-hand side of the equation is positive, the borrower chooses to maintain the property.

$$-\nu n + \beta(1-p)\left(\mathscr{V}_b\left(\frac{(1+g)n}{1-p}\right) - \mathscr{V}_b\left(\frac{(1-\theta)(1+g)n}{1-p}\right)\right) = 0 \tag{MN-B}$$

B.3.2. Contracts and Outcomes Chosen by Lenders

When lenders are constrained by borrowers' willingness to accept a principal pay down or to maintain a property, the optimal p falls on one of the boundaries defined in Section B.3.1. The pivotal boundary for lenders' management of stressed loans is whether they are willing to provide an extension to a borrower that will not accept a significant principal pay down and lacks the incentives to maintain the property. In other words, are lenders willing to extend a loan on the (DN-B) boundary?

Lender's decisions here amount to whether Extend-Neglect along that boundary gives a higher recovery than foreclosure. Lenders are indifferent between the two when:

$$r_m + p + \beta(1-p)\mathscr{V}_l(\mu_n n) - \Lambda n/\underline{\kappa} = 0 \tag{DN-L}$$

and will prefer to extend loans if that quantity is positive.

B.4. Calibration

I set $r = 4.5\%$ to match 30-year Treasury yields in the period of stress, and $r_m = 7\%$ to match the 2.5% loan rate spread for CRE loans in Table 1 of Glancy et al. (2022). I set $\alpha = 12.3$ to match the 5% discount required for immediate sales during expansions from Figure 8 in Sagi (2021).[15] I set $g = 0.01$ and $\sigma = 0.1$ to match the statistics on annual rent growth in Table 2 of An et al. (2016), and $\Lambda = .76$ to match the 24% deadweight foreclosure costs in Table Brown et al. (2006).[16] I set the decline in property values from deferred maintenance to $\theta = 0.045$ based on the additional annualized capital expenditures required of lenders following foreclosure to compensate for previous underinvestment by financially distressed owners from Table 7 of Brown et al. (2006).[17] It is unclear how much of this value decline is lost from inefficiency vs. transferred to borrowers. I assume a 50/50 split, meaning that $.5\theta n/\underline{\kappa} = \nu n$, making $\nu = 0.69$. In the baseline calibration, I set $\chi = 0$ based on the finding from Favara et al. (2024) that large U.S. banks do not engage in zombie lending for C&I loans regardless of capitalization.

[15] There is a 5% discount relative to a seller with a two year horizon. I approximate this as the expected discount from a forced sale relative to an investor with three times as many sale opportunities (year 0, 1 and 2). The minimum from 3 draws of a pareto distribution is pareto distributed with a shape parameter 3α. Since the expected sale is proportional to $\alpha/(1+\alpha)$, I set alpha to satisify $\alpha/(1+\alpha) = 0.95 \times 3\alpha/(1+3\alpha)$

[16] I use the measure of foreclosure costs that don't account for lenders' required capital expenditures due to deferred maintenance since such costs are captured in the model.

[17] Lenders of foreclosed properties spent had capital expenditure rates of 6.4%, compared to 1.5-2% for nondistressed owners.